Model Options

This section details how to enter and edit model run information using the options available through the Input menu.

Control Options: Displays the Control Options form for entering titles, selecting elevated terrain and flagpole receptor options, pollutant type and decay coefficient, dispersion options, and for specifying multiple pollutants.

Source Options: Displays the Source Options form for entering source groups, emission units, concentration units, deposition units, keyword commands, and other source data to the model.

Receptor Options: Displays the Receptor Options form entering meteorological file name, data period, wind speed category and direction, wind profile exponents and vertical temperature gradients, and other meteorological data to the model.

Meteorology Options: Displays the Meteorology Options form for entering options specific to receptors.

Output Options: Displays the Output Options form for specifying output file names for Tables, Max. files, Post files, Plot files, Rank files (AERMOD only), Toxx files, and Percent files from the model.

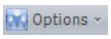
Projection

This option allows the user to specify the model objects projection. This is not mandatory. However, only if the user specifies the model objection projection, will he be able to set Map view projection or download map images from Microsoft TerraServer. Currently, Microsoft TerraServer provides map images for Longitude 60 degrees west to Longitude 174 degrees west (UTM zone 3-30).

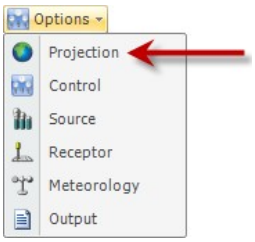
For background information on this topic see Why Use Projections and Why Use Datum's.

To access this form...

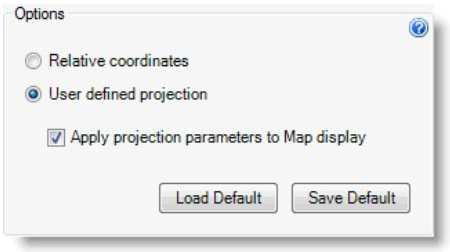
From the Project Tab: *Select the Projection button from the Model Options group*

From Other Tabs: *Click on* 

from the Model group



Options



Relative coordinates: Choose this option if the user doesn't want to specify the model objects projection, or the user can't find his projection type from the projection list on the right.

User defined projection: This option allows users to specify the model object projection, projection parameters, and datum that are used to define the coordinate system.

Apply projection parameters to Map display: This option is selected by default, and the user is advised to always choose this option. Choose this option means the Map view projection is set to be the same as model objects projection. Therefore, model objects will be displayed in the Map window using the same projection parameters with their coordinate reference system.

Save Default: This option saves the information displayed in the Projection parameters for future projects.

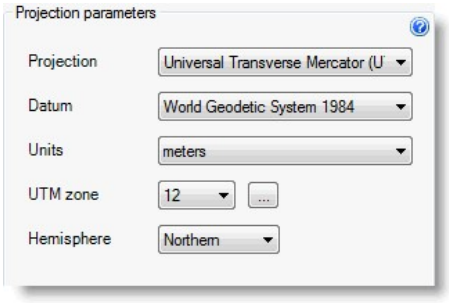
Load Default: Choose this option to load the default parameters set by the user.

Projection parameters

Projection parameters are required when the *User defined projection* option is selected.

Projection: Select the projection model objects are based on.

Universal Transverse Mercator (UTM) - The most common and recommended projection for use with the AERMOD modeling system.



Datum: Choose the type of datum used by the coordinate system

Units: The unit of coordinate. With Transverse Mercator and UTM projections, the unit is always meters

UTM zone: Choose the UTM zone in which the modeling site is located. Click the button for the UTM Zone map

Hemisphere: Choose Northern if the modeling site is located to the north of equator, and Southern if it is located to the south of equator

Mercator **-** An alternative projection. While Transverse Mercator projections other than Universal Transverse Mercator (UTM) may be used successfully, there can be some incompatibilities with other aspects of AERMOD. AERMAP is designed to work with UTM projections only, so an alternate method might be needed to determine model object elevations and receptor hill height scales.

Datum: To specify the type of datum used by the coordinate reference system

Units: The unit of coordinate. With Transverse Mercator and UTM projections, the unit is always meters

Origin Lon.: Longitude of the point that is set as origin of the Transverse Mercator zone. This point is always on the central meridian of the zone.

Origin Lat.: Latitude of the point that is set as origin of the Transverse Mercator zone

False East.: Abbreviation for False easting, planar offset for coordinate on the vertical map axis.

False North.: Abbreviation for False northing, planar offset for coordinates on the horizontal map axis

Transverse Mercator **-** An alternative projection. While Transverse Mercator projections other than Universal Transverse Mercator (UTM) may be used successfully, there can be some incompatibilities with other aspects of AERMOD. AERMAP is designed to work with UTM projections only, so an alternate method might be needed to determine model object elevations and receptor hill height scales.

Datum: To specify the type of datum used by the coordinate reference system

Units: The unit of coordinate. With Transverse Mercator and UTM projections, the unit is always meters

Origin Lon.: Longitude of the point that is set as origin of the Transverse Mercator zone. This point is always on the central meridian of the zone.

Origin Lat.: Latitude of the point that is set as origin of the Transverse Mercator zone

Scale factor: Ratio of distance on the map to distance on the ground along the central meridian of the UTM zone

False East.: Abbreviation for False easting, planar offset for coordinate on the vertical map axis.

False North.: Abbreviation for False northing, planar offset for coordinates on the horizontal map axis

Lambert Conformal Conic **-** The Lambert Conformal Conic projection is a standard projection for presenting maps of land areas whose East-West extent is large compared with their North-South extent. This projection is "conformal" in the sense that lines of latitude and longitude, which are perpendicular to one another on the earth's surface, are also perpendicular to one another in the projected domain. In essence, the projection superimposes a cone over the sphere of the Earth, with two reference parallels secant to the globe and intersecting it. This minimizes distortion from projecting a three dimensional surface to a two-dimensional surface. Distortion is least along the standard parallels, and increases further from the chosen parallels.While the Lambert Conformal Conic projection may be used successfully, there are some incompatibilities with other aspects of AERMOD. Meteorological data may need to be modified to deal with rotations imparted by the Lambert projection, although it may also be possible to use the Wind Direction Alignment option within AERMOD to deal with this situation. In addition, AERMAP is designed to work with UTM projections only, so an alternate method would be needed to determine model object elevations and receptor hill height scales.

Datum: To specify the type of datum used by the coordinate reference system

Units: The unit of coordinate. With Transverse Mercator and UTM projections, the unit is always meters

Origin Lon.: Longitude of the point that is set as origin of the Transverse Mercator zone. This point is always on the central meridian of the zone.

Origin Lat.: Latitude of the point that is set as origin of the Transverse Mercator zone

Std. parallel 1: Circle of latitude used as reference 1 to project display on a 2 dimensional surface.

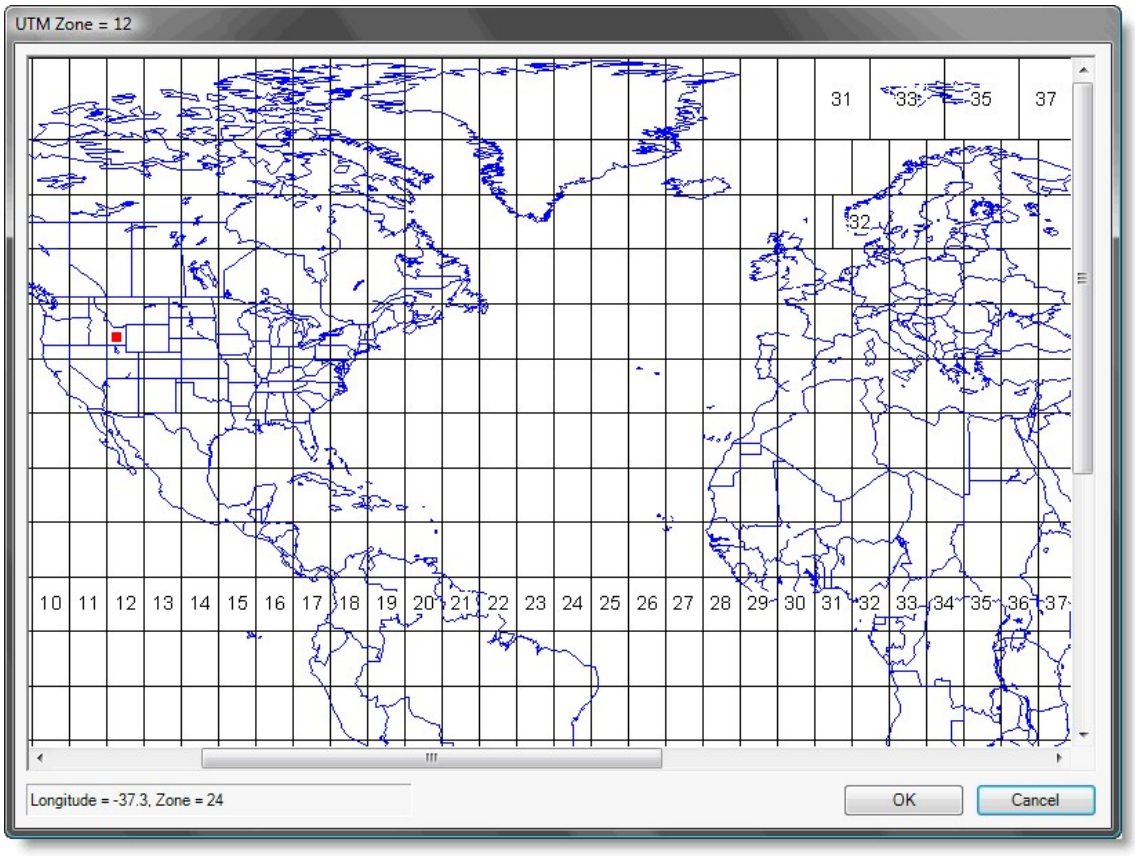
Std. parallel 2: Circle of latitude used as reference 2 to project display on a 2 dimensional surface.

False East.: Abbreviation for False easting, planar offset for coordinate on the vertical map axis.

False North.: Abbreviation for False northing, planar offset for coordinates on the horizontal map axis

UTM Zone

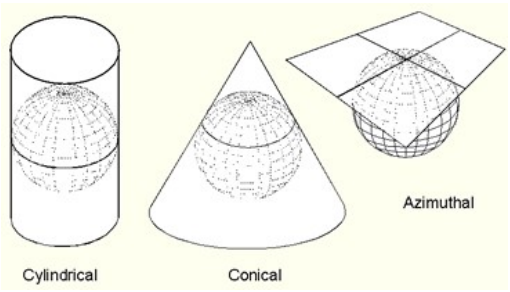
The following map assists in the identification of UTM zones. It should only be used as a guide to selecting the UTM zone. To select a zone, click with your left mouse button on the location of your project site. Press the OK button when done



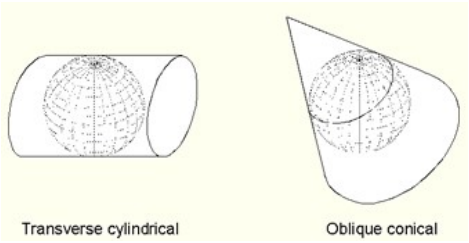
Why Use Projections

A map projection is the method of taking the earth's surface and displaying it on a flat surface such as map or computer screen. A sphere, unlike a polyhedron, cone, or cylinder, cannot be reformed into a plane. In order to portray the surface of a round body on a two-dimensional flat plane, you must first define a developable surface (i.e., one that can be cut and flattened onto a plane without stretching or creasing) and devise rules (projection parameters) for systematically representing all or part of the spherical surface on the plane. Any such process inevitably leads to distortions of one kind or another. Five essential characteristic properties of map projections are subject to distortion: shape, distance, direction, scale, and area. No projection can retain more than one of these properties over a large portion of the Earth. Some projections (e.g., Mercator) produce maps well suited for navigation. Other projections (e.g., equal-area projections, such as Lambert) produce maps well suited for visual analysis.

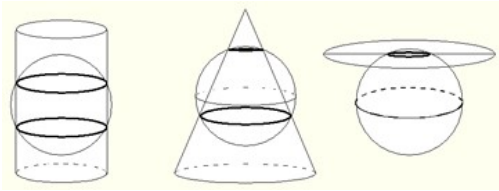
There are three classes of map projections, cylindrical, conical and azimuthal. The earth's surface projected on a map wrapped around the globe as a cylinder produces the cylindrical map projection. Projected on a map formed into a cone gives a conical map projection. When projected on a planar map it produces an azimuthal or zenithal map projections.



Projections can also be described in terms of their aspect: the direction of the projection plane's orientation (whether cylinder, plane or cone) with respect to the globe. The three possible aspects of a map projection are normal, transverse and oblique. In a normal projection, the main orientation of the projection surface is parallel to the earth's axis (as in the second figure below). A transverse projection has its main orientation perpendicular to the earth's axis. Oblique projections are all other, non-parallel and non-perpendicular, cases. The figure below provides examples of transverse and oblique aspect.



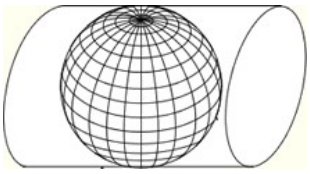
A map projection can be tangent to the globe, meaning that it is positioned so that the projection surface just touches the globe. Alternatively, it can be secant to the globe, meaning that the projection surface intersects the globe. The figure below provides illustrations.



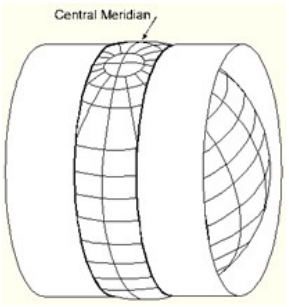
Here is a list of parameters that a map projection can have are:

- Aspect — Orientation of the projection on the display surface. Whenever the type of projection is specified, this parameter is also determined.
- Center or Origin — Latitude and longitude of the midpoint of the display.
- Scale Factor — Ratio of distance on the map to distance on the ground.
- Standard Parallel(s) — Chosen latitude(s) where scale distortion is zero.
- False Northing — Planar offset for coordinates on the vertical map axis.
- False Easting — Planar offset for coordinates on the horizontal map axis.
- Zone — Designated latitude-longitude quadrangle used to systematically partition the planet for certain classes of projections.

Note: In BREEZE AERMOD, model object projections are limited to Transverse Mercator that's based on a transverse cylinder, and Universal Transverse Mercator (UTM) that is a secant, cylindrical projection in a transverse position.



Transverse Mercator projection



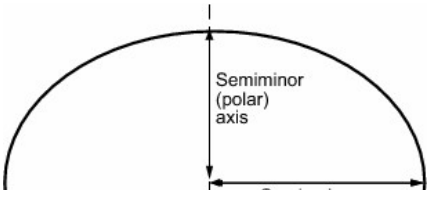
UTM projection

Reference: http://kartoweb.itc.nl/geometrics/Map%20Projections/body.htm

Why Use Datum's

When you are computing geospatial coordinates (e.g., for map projection), the earth is generally treated as an ellipsoid (an ellipse rotated around one axis). A datum, also referred as geodetic datum, is a mathematical description of the Earth ellipsoid which approximates the size and the shape of the Earth, plus defines the origin and orientation of the coordinate systems used to map the earth. To use one datum in coordinate system enables calculations such as position and area to be carried out in a consistent and accurate manner. An ellipsoid is usually specified by a semimajor and a semiminor axis, as shown in the following diagram.

Because the earth's shape is not uniform, a datum can be defined globally or locally (e.g., particular to one country). While empirically determining a datum is a complex geodetic and surveying task, the result simply enables a map producer to know what the Earth's radius is at any given point. There are many different local datums used in different parts of the world. These local datums provide a close approximation to the earth's surface in a particular area. Every chart or map has a map datum reference. The map datum is usually printed in the title block of the chart.



Each coordinate system uses a specific datum to approximate the earth's surface. Referencing coordinates to the wrong datum can result in position errors of hundreds of meters. If two coordinate systems use different datums, then the mapping software must perform a datum transformation when it converts coordinates from one coordinate system to the other. The Geographical Information System (GIS) software in BREEZE uses the Bursa-Wolfe datum transformation method, which is generally accurate to within 10 meters. (For conversion between two coordinate systems that use the same datum, no datum transformation is performed, and the results are generally accurate to within 0.1 meter.)

Common datums used by AERMOD modelers include:

NAD27 (North American Datum of 1927). NAD27 is defined with an initial point at Meads Ranch, Kansas, and by the parameters of the Clarke 1866 ellipsoid. The location of features on United States Geological Survey (USGS) topographic maps, including the definition of 7.5-minute quadrangle corners, are referenced to the NAD27.

NAD83 (North American Datum of 1983). NAD83 is an Earth-centered datum and uses the Geodetic Reference System 1980 (GRS 80) ellipsoid, unlike NAD27, which is based on the initial point at Meades Ranch, Kansas. Because the NAD83 surface deviates from the NAD27 surface, the position of a point based on the two reference datums will be different.

WGS 72 (World Geodetic System 1972). The definition of Defense Mapping Agency (DMA) Digital Elevation Models (DEMs), as presently stored in the USGS data base, references the WGS 72 datum. WGS 72 is an Earth-centered datum.

WGS 84 (World Geodetic System 1984). The WGS 84 datum was developed as a replacement for WGS 72 by the military mapping community as a result of new and more accurate instrumentation and a more comprehensive control network of ground stations.

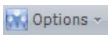
Reference: http://kartoweb.itc.nl/geometrics/Map%20Projections/body.htm

Control Options

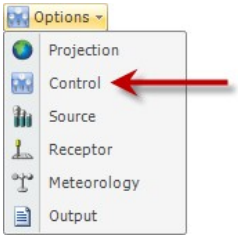
The main modeling options are input in the Control Options form. The Control Options form allows you to specify control options. To launch the Control Options form, select the Control Options button from the Project tab or select Options | Control from the Model group in other tabs (except Home)

To access this form...

From the Project Tab: *Click on:*

From Other Tabs: *Click on* 

from the Model group.



Folders on the Control Options Form

Main Options: Contains the main control options for the model

Other Options: Additional control options

Multi-year: Set up MultiYear run for PM10

Gas Deposition: Displayed when the Gaseous deposition control option is selected

Land Use: Displayed when the Gaseous deposition control option is selected

Ozone: Displayed when the NO2 Pollutant ID is selected

Pollutants: Displayed when the Multiple Pollutants pollutant name is selected

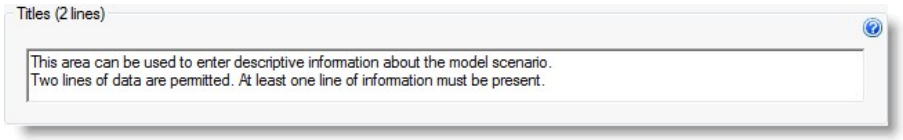
Main Options Tab

The Main Options folder is displayed whenever the Control Options screen is opened.

Titles

You may enter up to two lines of title information, with up to 68 characters per line. The title appears at the top of all output files for the model run. The first title is mandatory. The second title is optional.

Model Keyword: TITLEONE and TITLETWO

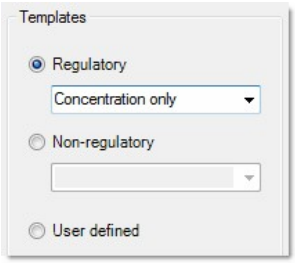

Titles (2 lines)
This area can be used to enter descriptive information about the model scenario.
Two lines of data are permitted. At least one line of information must be present.

Templates

Templates provide a quick method of displaying only the model options that are applicable to a specific type of run. They reduce the number of options displayed which can help novice or infrequent modelers focus on the options that are important to their current scenario.

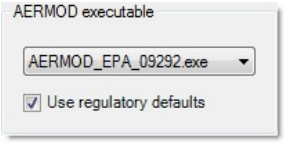
There are three options to select from:

1. Regulatory - Templates that force the U.S. EPA regulatory default option for regulatory modeling in the United States.
2. Non-regulatory - Templates that allow for U.S. EPA non-regulatory options. When modeling in the United States, it is often required to obtain prior permission to use these options for regulatory modeling.
3. User defined - When this option is selected, no template is used. Instead, the user can select from all options, regulatory or not.



AERMOD Executable

BREEZE allows you to select the AERMOD executable you wish to use for a specific model run. This gives you the ability to use previous versions of the dispersion model should you be required to.



The standard Fortran executables from the U.S. EPA, the enhanced BREEZE executables, and the AERMOD Parallel (MPI) executables are available for use. The name of the executable defines which one it is.

Naming Convention for Fortran Executables

MODEL_DEV_VER.exe (e.g., AERMOD_EPA_09292.exe)

MODEL: Indicates the model. This is usually AERMOD.
DEV: Indicates the developer and is either EPA or BREEZE. EPA indicates the exact same EPA version distributed by the U.S. EPA. BREEZE indicates the enhanced version of the model. BREEZE versions contain are based on the same U.S. EPA Fortran code, but include enhancements that go beyond the standard capabilities of the EPA version.

VER: This indicates the EPA version number of the dispersion model. The US EPA provides version numbers based on the date of release. For example, 09292 indicates the model was release on the 292nd day (i.e. 292) of year 2009 (i.e., 09). The 292 represents the Julian day the executable was released.

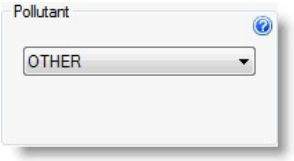
Use regulatory defaults

Model Keyword: DFAULT

When this check box is selected, BREEZE will prevent non-regulatory defaults from being selected. Many of these non-regulatory defaults will either be disabled or not displayed.

Pollutants

Select the pollutant to be used in the model run from the drop-down list box. You may also type in pollutant names (see the Pollutants folder for information on storing multiple pollutants in a project file)



Model Keyword: POLLUTID

AERMOD and ISC do not model chemical reactions. The following are important notes regarding each pollutant type listed.

SO2: When Urban is selected, the source is modeled with a 4 hour half life. If SO2 is listed as one of the multiple pollutants in a multi-pollutant run, the 4 hour half life will not be used.

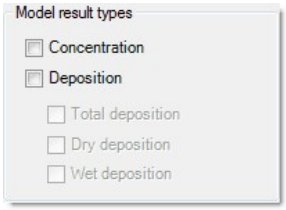
NO2: Choosing this pollutant enables the optional Ozone folder. This pollutant is only available when the "Non-regulatory" or "User defined" templates are selected.

PM10 or PM-10: If either of these pollutant id's are used, the multi-year option for generating the high-sixth-high in five years will be used.

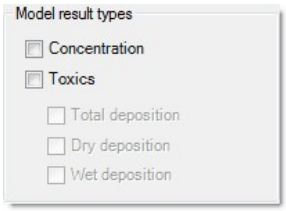
User defined: When selected, another field is displayed that allows you to specify a specific pollutant id that has a maximum of eight alphanumeric characters.

Multiple Pollutants: This pollutant option allows you to model multiple pollutants in a single model run. To use this option, you need to select BREEZE version AERMOD executable. Use this option only when scenarios do not require deposition data (e.g., runs resulting in Concentrations only and those that do not model Open Pit sources) and Ozone data (e.g., no OLM or PVMRM is chosen). the Pollutants folder is displayed in the Control Options form.

Model Result types



When version 09292 is selected.



When version 07026 is selected.

Concentration: Model Keyword: CONC - Calculates pollutant concentrations in the air.

Toxics: Model Keyword: TOXICS - This is a non-regulatory option and is only available when the 07026 AERMOD executable is selected. It must be selected to model deposition and depletion. Selecting the Toxic option does not require you to model deposition, however. This option, when selected, will enable the "Use optimized area source depletion algorithm"

Deposition: Model Keyword: *N/A* - This is a regulatory option as of the 09292 version and is only available when the 09292 AERMOD executable is selected. It must be selected to model deposition.

Total deposition: Model Keyword: DEPOS - Calculates total deposition flux (i.e., sum of dry and wet deposition flux) on the ground. This option requires particle information, scavenging coefficients, and specially processed meteorological data.

Dry deposition: Model Keyword: DDEP - Enabled when the Toxics (in 07026) or Deposition (in 09292) control option is selected. Calculates dry deposition flux on the ground. This option requires particle information and specially preprocessed meteorological data. When this option is selected, dry removal mechanisms (depletion) are enabled for both concentration and dry deposition flux calculations. In the 09292 version, the depletion options can be turned off.

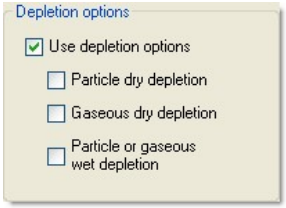
Wet deposition: Model Keyword: WDEP - Enabled when the Toxics (in 07026) or Deposition (in 09292) control option is selected. Calculates wet deposition flux on the ground. This option requires particle information, scavenging coefficients, and specially preprocessed meteorological data. When this option is selected, wet removal mechanisms (depletion) are enabled for both concentration and wet deposition flux calculations. In the 09292 version, the depletion options can be turned off.

Note: One or more of these options can be selected. All deposition options require certain source parameters and specially processed meteorological data, including: friction velocity, Monin-Obukhov length, and surface roughness length (for dry or wet deposition). Additionally, the wet deposition option requires precipitation code and precipitation rate.

Note: When particles are modeled, a settling velocity and a deposition velocity are calculated for each size category. The settling velocity causes the plume to "tilt" towards the surface (if the plume is elevated) as it travels downwind, while the deposition velocity is used to calculate the flux of matter deposited at the surface. Beginning with version 04300, the dry and/or wet removal (depletion) mechanisms (the DRYDPLT and WETDPLT options in earlier versions of AERMOD) will automatically be included in the calculated concentrations or deposition flux values if the dry and/or wet deposition processes are considered. Dry and wet removal effects on calculated concentration values can be included even if deposition flux values are not being calculated. However, the additional data requirements for dry and wet deposition must be met in order for dry and wet removal to be included in the concentration calculations.

Depletion options

- Depletion options are only available when the 09292 AERMOD executable is selected.
- This option requires pollutant particle or gaseous information and specially preprocessed meteorological data.
- Depletion options can be used for either concentration or deposition result types.
- If only particle depletion is selected (either dry or wet), then all sources will require particle deposition information.
- If only gaseous depletion is selected (either dry or wet), then all sources will require gaseous deposition information.
- If both gaseous and particle depletion is selected, then each source will require either gaseous or particle deposition information, but not both.



Use depletion options: Select this option to override AERMOD's default setting of modeling depletion when particle or gaseous information for sources is included in a model scenario. By selecting this option, the user is explicitly requesting that AERMOD either model or not model depletion. If a check box is not checked, a keyword is written to the AERMOD input file forcing the model not to model the specified depletion type. When a check box is placed in the box, a keyword is written to the AERMOD input file forcing the model to model the specified depletion type.

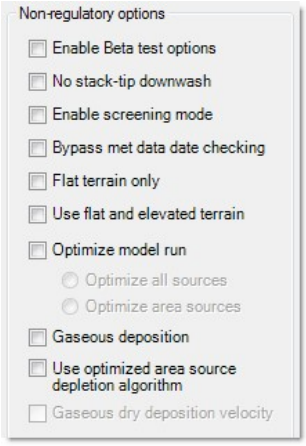
Particle dry depletion: When checked, explicitly requires AERMOD to model particle dry depletion (Model Keyword: DRYDPLT). When not checked, explicitly

requires AERMOD to not model particle dry depletion (Model Keyword: NODRYDPLT)

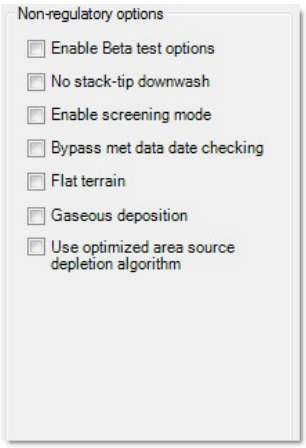
Gaseous dry depletion: This option is only available when the the regulatory default option is not selected. When checked, AERMOD will invoke the gaseous depletion algorithms. This option will require Gas Deposition and Landuse information to be specified in the Control Options form.

Particle or gaseous wet depletion: When checked, explicitly requires AERMOD to model wet depletion (Model Keyword: WETDPLT). When not checked, explicitly requires AERMOD to not model wet depletion (Model Keyword: NOWETDPLT)

Non-regulatory options



Non-regulatory default optioins when using the 09292 AERMOD executable.



Non-regulatory default optioins when using the 07026 AERMOD executable.

Enable Beta test options: Model Keyword: BETA - When checked, additional "test" or "beta" EPA options become available. Such options include the use of the POINTCAP (capped point source) and POINTHOR (horizontal point source) source types.

No stack-tip downwash: Model Keyword: NOSTD - When checked, stack tip downwash calculations are not performed.

Enable screening mode: Model Keyword: SCREEN - When checked, the AERMOD screening mode is turned on to allow the model to run without using wind directions. Each source-receptor combination will be modeled as if the source plume centerline is directly over the receptor.

Bypass met data date checking: Model Keyword: NOCHKD - Select this to not check that the meteorological data is sequential, with no gaps. By not selecting this, a valuable quality check is made on the meteorological input data. If non-sequential data are intentionally being used (e.g., for comparisons against field data for model evaluation purposes), check this box.

Flat terrain: Model Keyword: FLAT - When checked, does not require the use of terrain elevation data. If not checked, AERMOD will look for elevation data for model objects, but will not fail if data is not provided.

Gaseous deposition: Model Keywords: Requires both GDSEASON and GDLANUSE - Invokes the gaseous deposition algorithms. The "Toxics" option when using the 07026 AERMOD executable or the "Dry deposition" option when using the 09292 AERMOD executable must be enabled for this option to be selected. Additional control and source parameters are required with this option. This option is only enabled when at least one of the deposition result types is selected.

Use optimized area source depletion algorithm: Model Keyword: AREADPLT - The "Toxics" option when using the 07026 AERMOD executable or the "Deposition" option when using the 09292 AERMOD executable must be enabled for this option to be selected. This option is selected to optimize plume depletion due to dry removal mechanisms for area type sources.

Additional Options for the 09292 AERMOD Executable Only

Use flat and elevated terrain: Model Keyword: FLAT ELEV - (Option when using the 09292 AERMOD executable) When checked, indicates that individual sources may be flagged to use either FLAT or ELEV (elevated) terrain assumptions. When this option is selected, the Source form displays the option to flag the source. The Data tab will also indicate if a source is flagged to be modeled as if in flat terrain only.

Optimize model run: Two options are available to optimize model runtime.

Optimize all sources: Model Keyword: FASTALL - Option to optimize model runtime through use of an alternative implementation of horizontal meander for POINT and VOLUME sources; also optimizes model runtime for AREA type sources and OPENPIT sources through a hybrid approach.

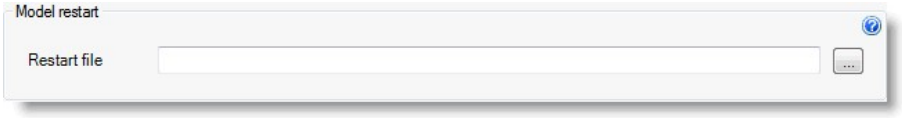
Optimize area sources: Model Keyword: FASTAREA - Option to optimize model runtime through a hybrid approach for AREA type sources and OPENPIT sources only.

Gaseous dry deposition velocity: Model Keyword: GASDEPVD - This option allows the user to specify the dry deposition velocity for gaseous emissions. A single dry deposition velocity can be input for a given model run, and is used for all sources of gaseous pollutants. Selection of this option will by-pass the algorithm for computing deposition velocities for gaseous pollutants, and should only be used when sufficient data to run the algorithm are not available. When this option is selected, there is no need to specify the information in the Gas Deposition and Landuse tabs.

Other Options Tab

The Other Options folder contains additional control options.

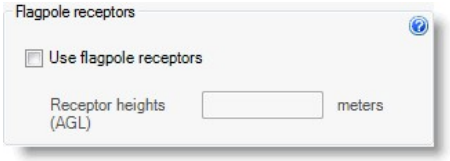
Model restart



Model Keyword: INITFILE

Restart file: Optional file that can be specified to initialize the model from a previously saved file. This option works in conjunction with the Save File option. The Save File option creates the file that is specified in this field. You do not need to use this option if you use the BREEZE enhanced save file option. This option can not be used when Multiple Pollutants are being modeled.

Flagpole receptors



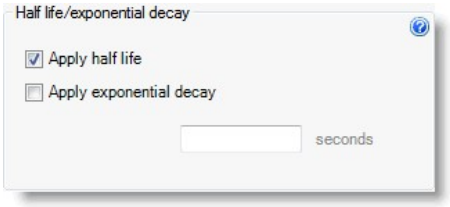
Model Keyword: FLAGPOLE

Use flagpole receptors: When checked, receptor concentrations can be modeled at a height above local ground level. If you do not select this option, any entered flagpole heights will be removed from the data file. Flagpole heights for each receptor can be specified in the receptor forms.

Receptor heights: If flagpole receptors are to be modeled, an optional default receptor height value can be specified that will be used for those receptors that do not have a flagpole receptor height.

Half life / exponential decay

The model provides the option to use exponential decay of the pollutant being modeled.



Displayed only when the regulatory default switch is not selected.

The relationship between the below parameters is Decay = 0.693/HalfLife.

Apply half life:
Model Keyword: HALFLIFE

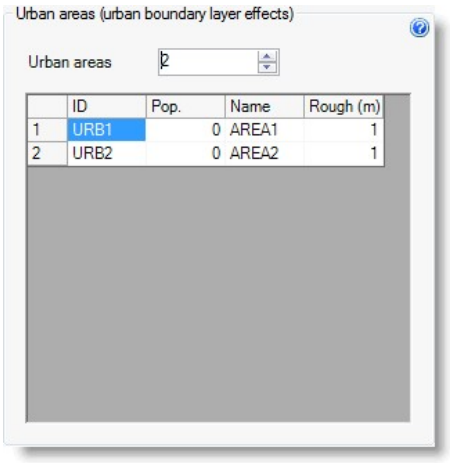
Used to specify the half life of the pollutant being modeled for exponential decay in seconds,

Apply exponential decay:
Model Keyword: DCAYCOEF

Used to to specify the decay coefficient of the pollutant being modeled in units of s^{-1}.

Urban boundary layer

AERMOD includes the option to specify multiple urban areas within the same model run. This option may be applicable for large domains that encompass more than one identifiable urban area where the separation is large enough to warrant separate treatment of the urban boundary layer effects.



Model Keyword: URBANOPT

This option should be checked if any of the sources are within an urban area. When checked, population and surface roughness of the city (in meters) must be entered to approximate the anthropogenic heat flux and turbulent wind profile, respectively.

Urban areas: Specify the number of urban areas identified within the modeling domain.

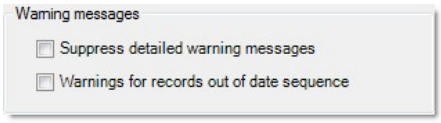
ID: The id used to identify the urban area. Can be up to eight alphanumeric characters.

Pop.: The population of the urban area.

Name: An optional name used to identify the name of the urban area.

Rough (m): The urban roughness parameter to specify the urban roughness length. This parameter is typically 1/10th the average height of roughness elements in the urban area. The default value is 1 meter. When the 09292 AERMOD executable is selected along with the use of the regulatory default option, the roughness parameter must be 1.0.

Warning messages



Suppress detailed warning messages: Model Keyword: NOWARM - Check this box to suppress printing of warning messages in the main output file.

Warnings for records out of date sequence: Model Keyword: WARNCHKD - This option is only available when the 09292 AERMOD executable is selected. This option issues warning messages rather than fatal errors for non-sequential meteorological data files, in order to allow use of multi-year meteorological data files that may contain gaps between years of data. This option can be used with the regulatory default option.

Multi-year Tab

Multi-year

The 24-hour NAAQS for particulate matter with aerodynamic particle diameters of 10 microns or less (PM-10) is in the form of an expected exceedance value, which cannot be exceeded more than once per year on average over a three year period for purposes of attainment demonstrations. Modeling demonstrations of compliance with the PM-10 NAAQS are based on the High-N+1-High value over N years, or in the case of five years of NWS meteorological data, the High-6th-High (H6H) over five years. In the AERMOD model, the H6H 24-hour average over five years can be modeled in one of two ways: 1) running five individual years and combining the results using the CO MULTYEAR option, as described in Section 3.2.12 of the EPA AERMOD User's Guide; or 2) using a single five-year meteorological data file and specifying the SIXTH (or 6TH) highest value on the OU RECTABLE card. If applied properly, the results of these two approaches will be equivalent. The special processing consisting of the 99th percentile 24-hour value averaged over N years for PM-10 in previous versions of AERMOD, referred to as the "Post-1997" PM-10 option, has been removed since that standard was vacated.

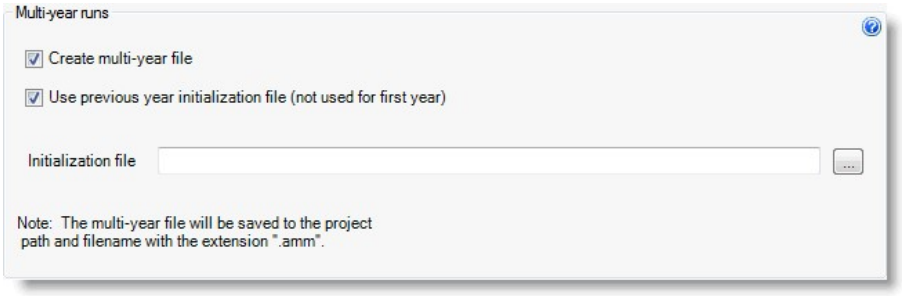
To use the first method to perform PM10 analyses according to the pre-1997 NAAQS, the user needs to specify the MULTYEAR card on the CO pathway. The syntax and type are now as follow,

Syntax: CO MULTYEAR H6H Savfil (Inifil)

where H6H is a new secondary keyword that identifies this as a pre-1997 analysis, the Savfil parameter specifies the filename for saving the results arrays at the end of each year of processing, and the Inifil parameter specifies the filename to use for initializing the results arrays at the beginning of the current year. The Inifil parameter is optional, and should be left blank for the first year in the multi-year series of runs.

When run the first year meteorological data, check the Create multi-year file check box, and leave the rest empty. A file that contains results of this run will be generated automatically. The file name will be the project name with the extension .amm.

To run the following years, check both Create multi-year file and Use previous year initialization file check boxes; select the previous .amm file for the Initialization file text field.


Multi-year runs
Create multi-year file
Use previous year initialization file (not used for first year)
Initialization file
...
Note: The multi-year file will be saved to the project path and filename with the extension ".amm".

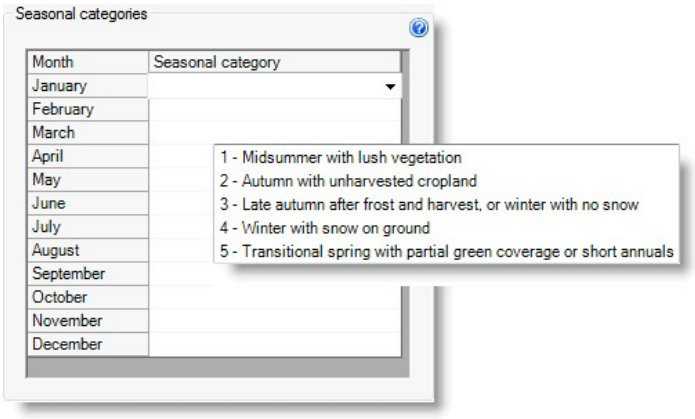
Gas Deposition Tab

The Gas Deposition tab is enabled when one of the following scenarios are modeled:

1. When one or more of the following result types are selected with the non-regulatory default option "Gaseous deposition"
   a) Total deposition
   b) Dry deposition
   c) Wet deposition.
2. When the 09292 AERMOD executable is selected AND the "Gaseous dry depletion" option is selected AND the "Gaseous dry deposition velocity" option is not selected.

Seasonal categories must be defined using the Argonne National Lab (ANL) report for each of the calendar months, and must also define the land use category and three pollutant-specific physical parameters that are provided in the appendices of the ANL report.

Seasonal categories



Model Keyword: GDSEASON

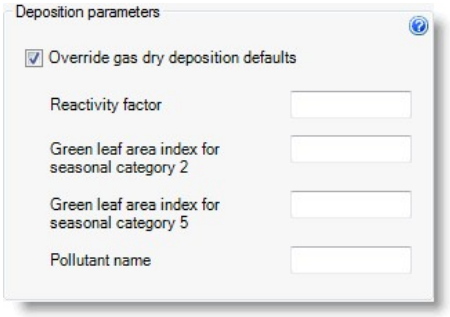
Seasonal Category: For each month, click the drop down box to choose one of the seasonal categories to represent that month.

The deposition algorithms include land use characteristics and some gas deposition resistance terms based on five seasonal categories, defined in Table 2 of the ANL report as:

Seasonal Category	Description
1	Midsummer with lush vegetation
2	Autumn with unharvested cropland
3	Late autumn after frost and harvest, or winter with no snow
4	Winter with snow on ground
5	Transitional spring with partial green coverage or short annuals

Deposition parameters

You can override the default values of the reactivity factor (fo), and the fraction (F) of maximum green leaf area index (LAI) for seasonal categories 2 and 5.


Deposition parameters
Override gas dry deposition defaults
Reactivity factor
Green leaf area index for seasonal category 2
Green leaf area index for seasonal category 5
Pollutant name

Model Keyword: GASDEPDF

Reactivity factor: Value of the pollutant reactivity factor. Enter a value to replace the default value of 0 used internally by AERMOD. A reactivity factor value of 1 should be input for ozone (O_3), titanium tetrachloride ($TiCl_4$), and divalent mercury (Hg^{2+}), and a value of 0.1 should be input for nitrogen dioxide (NO_2). A value of F=1.0 is used for seasonal categories 1, 3, and 4.

Green LAI for seasonal category 2: Fraction of the maximum green leaf area index (LAI) for seasonal category 2. Enter a value to replace the default value of 0.5 used internally by AERMOD.

Green LAI for seasonal category 5: Fraction of the maximum green leaf area index (LAI) for seasonal category 5. Enter a value to replace the default value of 0.25 used internally by AERMOD.

Pollutant name: (optional) Name of the pollutant.

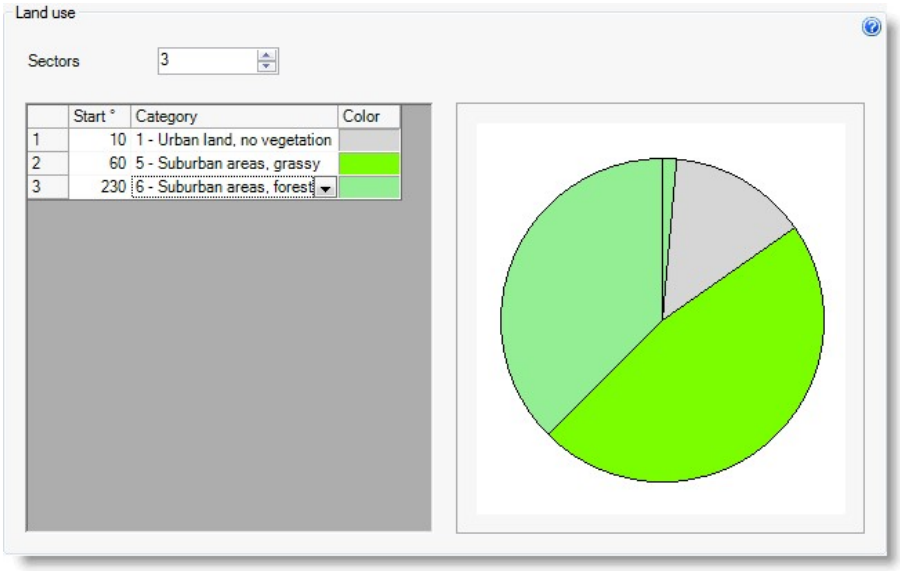
Land Use Tab

The Gas Deposition tab is enabled when one of the following scenarios are modeled:

1. When one or more of the following result types are selected with the non-regulatory default option "Gaseous deposition"
   a) Total deposition
   b) Dry deposition
   c) Wet deposition.
2. When the 09292 AERMOD executable is selected AND the "Gaseous dry depletion" option is selected AND the "Gaseous dry deposition velocity" option is not selected.

The deposition algorithms include some gas deposition resistance terms based on five seasonal categories, and on nine land use categories as (see Table 1 of Appendix ANL Report).

Land use



Model Keyword: GDLANUSE

Sectors: Land use categories for the source or facility being modeled are defined by wind direction sectors where the wind blows toward the area covered from the start angle of the current sector through the start angle of the next sector. There can be a maximum of 36 sectors. Type or use the up / down arrows to define the number of sectors you want to supply a land use category for. Zero (0) degrees represents North.

Start: For each sector, click on the cell and select the starting angle of that sector. The first sector will always start from 10 degrees. Each sector represents the wind flow over that sector plus and minus 5 degrees. For example, if sector one was defined as 10-30 degrees, wind flow would be over the area covered by 5 degrees to 35 degrees.

Category: The following table displays the land use categories that can be selected for each sector. Click on the grid cell to select the desired land use category. The radius of the each sector is 3 kilometers.

Land Use	Description

Category	
1	Urban land, no vegetation
2	Agricultural land
3	Rangeland
4	Forest
5	Suburban areas, grassy
6	Suburban areas, forested
7	Bodies of water
8	Barren land, mostly desert
9	Non-forested wetlands

Sector Display: The image on the right of the form displays the sectors defined. The center of the circle represents the source or facility being modeled.

Ozone

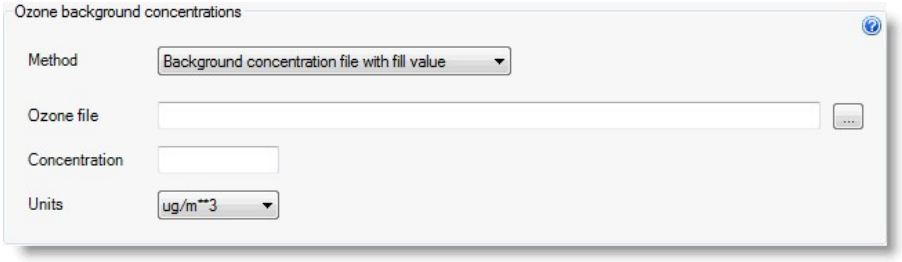
The Pollutant ID must be set to NO2 for the Ozone folder to be enabled.

This section provides a description of the inputs related to the non-default PVMRM (Plume Volume Molar Ratio Method) and OLM (Ozone Limiting Method) options for modeling the conversion of NO_x to NO_2.

The PVMRM and OLM algorithms have been implemented as non-default options. A Beta-test draft model option, PSDCREDIT, has been added for use when an application is for increment consumption with PSD credits using PVMRM.

Ozone background concentrations

Background ozone concentrations can be input as a single value, or may be input as hourly values through a separate data file.



Method: One of three methods of applying background ozone concentrations can used.

- Single background concentration: (Model Keyword: OZONEVAL)
- Background concentration file: (Model Keyword: OZONEFIL)
- Background concentration file with fill value: (Model Keyword: OZONEVAL)

Ozone file: The name of the ozone background concentration file.

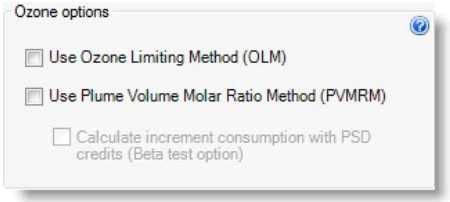
Concentration: The ozone background concentration. If the "Background concentration file with fill value" option was selected, this concentration is used to fill missing data in the ozone background file. If a background ozone concentration has been specified, then that value will be used to substitute for missing ozone data from the ozone file. If no background concentration value is specified, then the model will assume full conversion for hours with missing ozone data.

Units: Select the units of the ozone background concentration data. If units of PPM or PPB are selected, the model will convert the concentrations to micrograms/cubic-meter based on the reference ambient temperature and the base elevation specified of the meteorological station.

Values of ozone concentrations in the ozone data file that are less than zero or greater than or equal to 900.0 will be regarded as missing.

Ozone options

The PVMRM and OLM options for modeling NO2 conversion are non-default options, and only one of these options can be specified for a given model run. Both options require that the pollutant ID be specified as 'NO2'

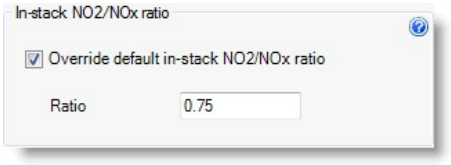

Ozone options
Use Ozone Limiting Method (OLM)
Use Plume Volume Molar Ratio Method (PVMRM)
Calculate increment consumption with PSD credits (Beta test option)

Use Ozone Limiting Method : (Model Keyword: OLM) Specifies that the non-default Ozone Limiting Method (OLM) for NO2 conversion will be used.

Use Plume Volume Molar Ratio Method: (Model Keyword: PVMRM) Specifies that the non-default Plume Volume Molar Ratio Method (PVMRM) for NO2 conversion will be used.

Calculate increment consumption with PSD credits: (Model Keyword: PSDCREDIT) Specifies that the EPA Beta test option will be used to calculate the increment consumption with PSD credits using the PVMRM option. This option for is available only when the PVMRM option is selected and is used to account for NO/NO2 chemistry of combined plumes in the computation of increment consumption with PSD credits.

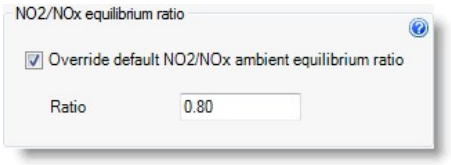
In-Stack NO2/NOX ratio



Override default in-stack NO2/Nox ratio: (Model Keyword: NO2STACK) The in-stack NO2/Nox ratio can be specified for the PVMRM or OLM options by selecting this option and specifying a default value (Ratio) to be used for all sources.

Ratio: The default in-stack NO2/Nox ratio that will be used. Value can be a number between 0.0 and 1.0, inclusive.

NO2/NOX equilibrium ratio



Override default NO2/Nox ambient equilibrium ratio: (Model Keyword: NO2EQUIL) The PVMRM option for modeling conversion of NO to NO2 incorporates a default NO2/NOx ambient equilibrium ratio of 0.90. Use this option to override the default value.

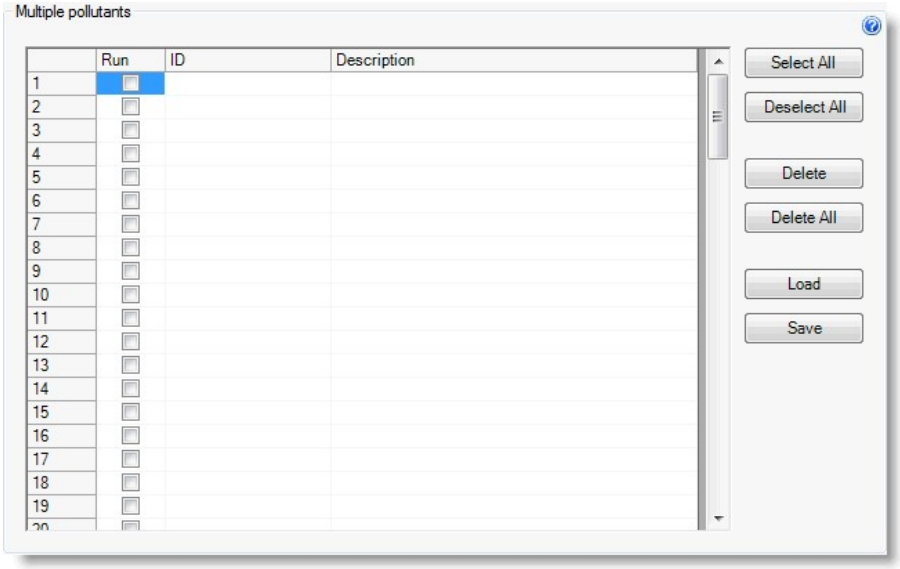
Ratio: The ratio to be used. Value can be a number between 0.1 and 1.0, inclusive.

Multiple Pollutants Tab

Multiple Pollutants

The BREEZE Multi-Scenario Processor (MSP) is an option when modeling Concentrations only. It is not available for model runs that contain deposition options.

The BREEZE Fortran executable must be selected to model multiple pollutants at the same time.



Run: Place a check in the box for each pollutant you want to model.

ID: Enter the identification of the pollutants to be included in the current modeling project. Each ID must be 8 characters or less and can contain no spaces.

Description: Enter an optional description for the pollutant to be modeled.

Source emission rates for each pollutant are specified in the pollutants folder of the source form.

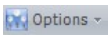
Source Options

The Source Options form allows you to specify source groupings, emission units, output units, and special keyword commands. To launch the Source Options form, choose the Source Options button from the Project tab

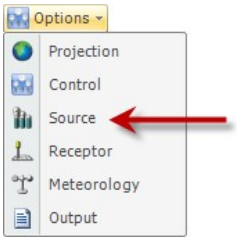
or select *Source Options* from the Options menu under the Model group in.,l5 the other tabs.

To access this form...

From the Project Tab: *Click on:*

From Other Tabs: *Click on* 

from the Model group.



Folders on the Source Options Form

Source Groups: Group sources

Urban Areas: Associate urban areas with sources.

Units: Concentration and deposition output units.

Include Files: External source data files to include in the model scenario.

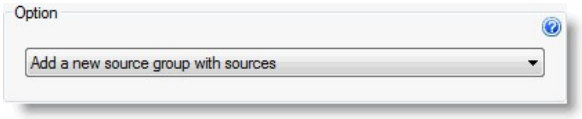
Source Tools: Tools to assist in populating source forms.

Source Groups

This folder allows you to group contributions from particular sources together (i.e., create source groups). Several source groups can be setup in a single run, and they may, for example, be used to model impacts from a group of sources being permitted, the group of increment consuming PSD (prevention of significant deterioration) sources, and the group of all sources for comparison to a NAAQS (national ambient air quality standards).

Each source group modeled will generate results in the output list file for that group. Plot files used for contouring model results can be created for each source group by selecting the appropriate options in the Output Options form. These Plot files can be contoured with BREEZE 3D Analyst.

Option



Add a new source group with sources: Select this item to create a custom source group that contains sources that you specify.

Add sources to an existing source group: Select this item to add sources to a source group that already exists.

Add an ALL source group for all sources: Select this item to add the ALL source group. This is a special source group name that includes all sources modeled. There is no need to define the sources that belong to this source group.

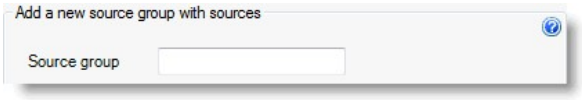
Press the Add button to create the ALL source group.

Add source groups for a source contribution analysis: Select this item to create a source group for every source in the modeling scenario. The source group ID(s) will be the same as the corresponding source ID(s). The Contribution option is ideal for determining source culpability.

Press the Add button to create the source groups.

Add a new source group with sources

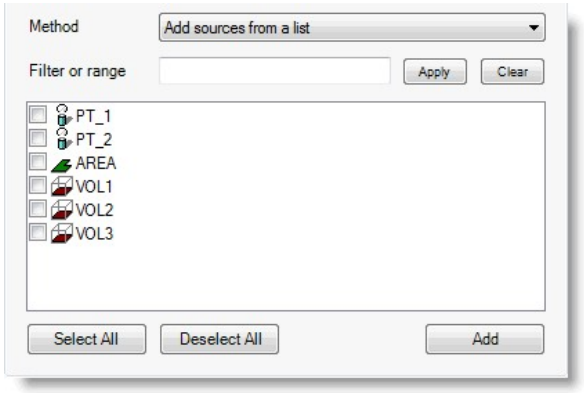
Select this item to create a custom source group that contains sources that you specify.



Source group: Enter a source group id to represent the source grouping. The id must be eight or less alphanumeric characters with no spaces

Method: Select the method you would like to group sources.

Add sources from a list:



Filter or range: Enter an optional filter value to limit the display of model objects.

Apply: Click to apply the filter.

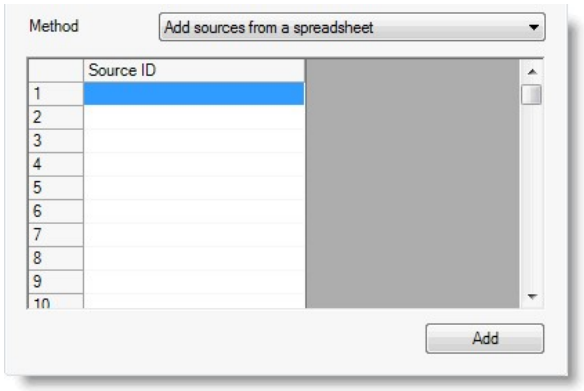
Select All: Places check marks in all of the model objects in the display.

Deselect All: Removes all of the check marks.

Add: Adds the selected (i.e., checked) model objects to the source group.

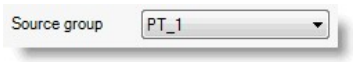
Add sources from a spreadsheet:

This option allows you to type or copy a list of source IDs from a spreadsheet (each id must be eight alphanumeric characters or less). These source IDs are the names or IDs of the sources that you would like to include in a source group. Press the Add button to add the list to the specified source group.



Add sources to an existing source group

Select this item to add sources to a source group that already exists.
See Add a new source group with sources for additional details. Many of the options are the same. Only those that are different are described here.

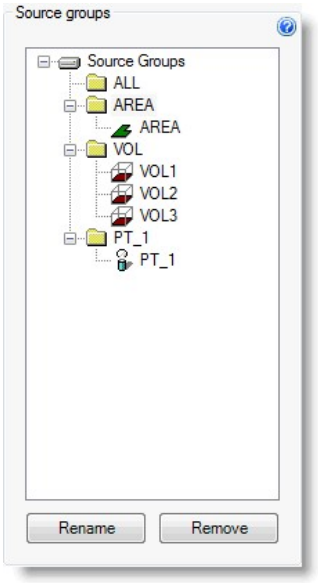


Source group: Select from the drop down list the existing source group name that you would like to add sources to.

Source groups

Displays all of the source groups in the current project. A folder represents each source group. Click the + sign to the left of the folder to view the source(s) that make up the source group. An unlimited number of source groups can be modeled (dependent upon system resources).

Note: There must always be at least one source group in a model run. The default source group (ALL) consists of all the sources in the modeling scenario.



Urban Areas

This tab is only displayed if urban areas were defined in the Control Options form.

Add source to urban area

Sources can be assigned to an urban area one at a time through the source form or many at a time using this utility. To add multiple sources to an urban area, follow these steps:

1. Select an urban area from the drop down list.
2. Select the method for assigning sources to the urban area.

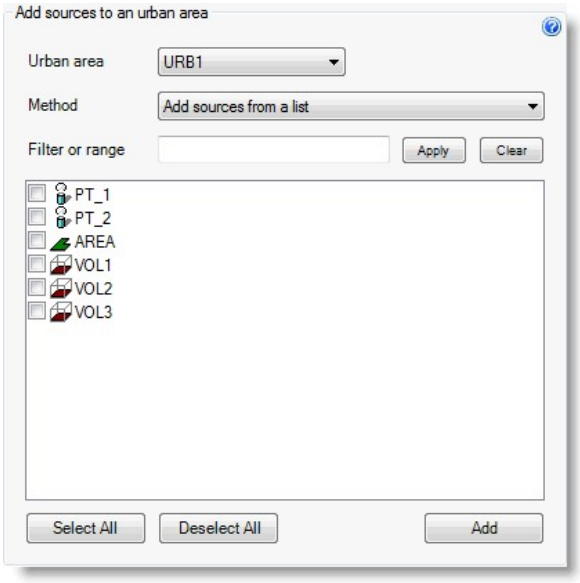
   Add sources from a list

      Specify an optional filter or range to reduce the display of source ID's.

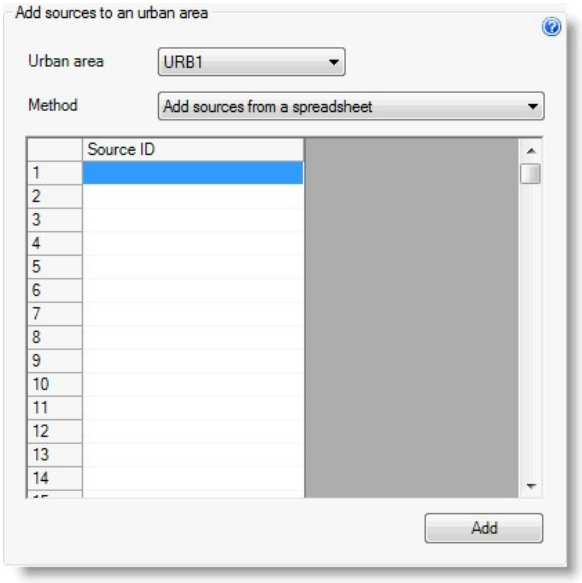
      Select the sources you wish to add to the specified urban area and press the Add button.

   Add sources from a spreadsheet

      Copy or type the source ID's into the grid that is displayed. Press the Add button to add the sources to the specified urban area.



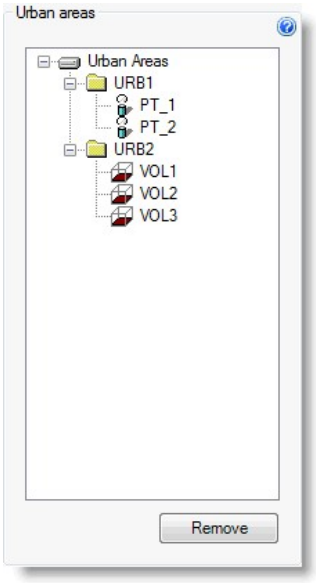
List Option



Spreadsheet Option

Urban areas

This group box identifies the sources that "belong" to each urban area. Urban areas must first be defined in the Control Options form.

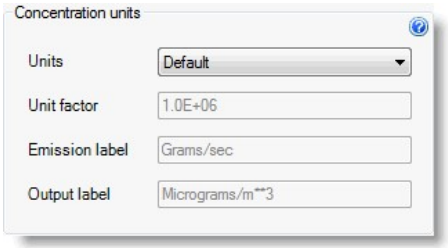


Units

The Units folder allows the user to specify a different unit conversion factor, and to specify the appropriate label for the output units for either concentration or deposition calculations.

The default emission rate units for the models are grams per second (g/s) for point and volume sources, and grams per second per square meter (g/s-m^2) for area and open-pit sources. By default, the models convert these input units to output units of micrograms per cubic meter (micrograms/m^3) for concentration calculations and grams per square meter (grams/m^2) for deposition calculations. This is accomplished by applying a default emission rate unit factor of 1.0E06 for concentration and 3600 for deposition. The deposition factor essentially converts the emission rate to grams per hour (g/hr) for total deposition calculations.

Concentration units



Units: Choose from the drop down list box the units you would like your output concentration results to be reported in (e.g., milligrams/m3). Choose "Custom" from the list box if you would like to enter your own output units (e.g., units of PPM).

The default output units for concentration and deposition are micrograms/m^3 and grams/m^2, respectively.

*The following fields are enabled only when **Custom** is selected from the Units drop down list.*

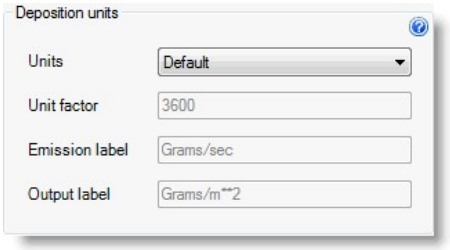
Unit Factor: Enter the factor that is needed to convert to your desired output units. This field will automatically be populated if you select the units from the Units drop-down list box. If Custom is chosen, you must supply a unit factor.

Emission Label: Enter the emission units label (up to 40 characters). This field will automatically be populated if you select the units from the Units drop-down list box.

Output Label: Enter the concentration or deposition output units label (up to 40 characters). This field will automatically be populated if you select the units from the Units drop-down list box.

Deposition units

See Concentration units for an explanation of these parameters. These parameters apply to deposition output instead of concentration output.



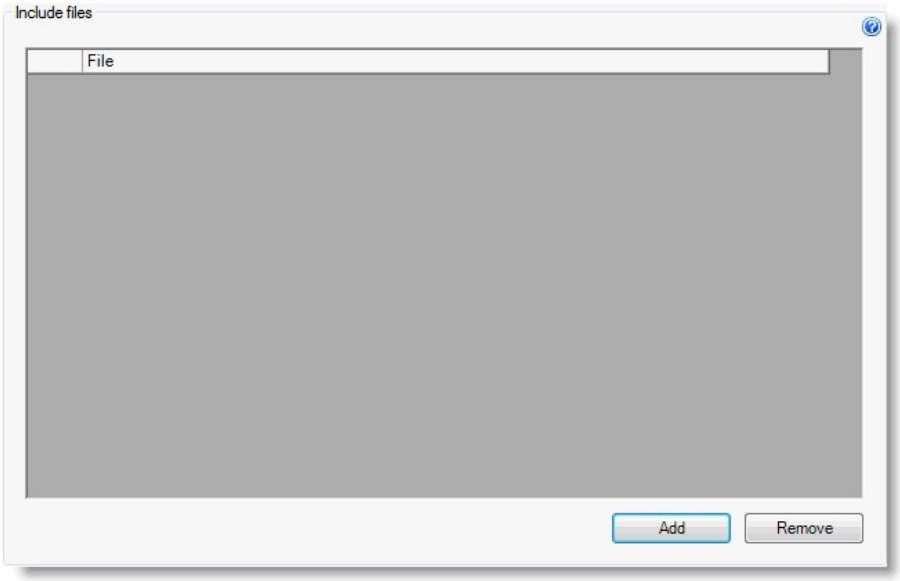
Include Files

Include files allow sources from external files to be included into the current model scenario.

Source include files can contain only source data. The data in the included file will be processed as though it were part of the input runstream file. The contents of the included file must be valid runstream images for the source pathway.

If an error is generated during processing of the included file, the error message will report the line number of the included file. If more than one INCLUDED file is specified for the source pathway, the user will first need to determine which file the error occurred in.

Include Files



Model Keyword: INCLUDED

File: Directory path and file name of the file containing the source information. You can double click on the file name to manual edit it.

Add: Click on this button to select the file name you wish to include with this model run.

Remove: Click this button to remove the selected file from the list of files.

Source include files contain only source data specific to each source. The following is an example:

```
SO LOCATION SRC1   POINT   308770.6   4463273.8   1302
SO LOCATION   SRC2   POINT   380258.1   4489558.2   1372
```

```
SO SRCPARAM  SRC1  1.000000E+02  60.38697  298  0.000762  0.7432243
SO SRCPARAM  SRC2  3.000000E+02  45.72  300  3.386667E-04  0.5574182
```

Additional information for emission factors, building downwash, etc. can be included in the file.

Hourly File

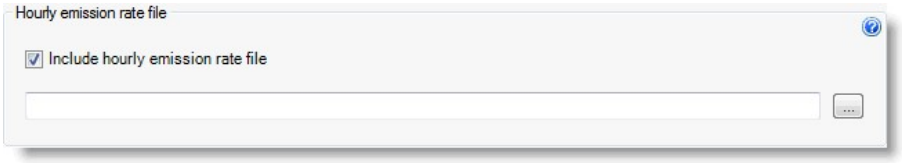
The model allows for a single hourly emission file to be used with each model run.

The data in the hourly emission file must include the exact same dates as are included in the meteorological input files, and the source IDs must correspond to the source IDs defined in the model input file. The model will check for a date mismatch between the hourly emissions file and the meteorological data, and also for a source ID mismatch. However, it is not necessary to process the entire hourly emissions file on each model run, as long as all the dates (including those that are processed and those that are skipped) match the meteorological data files.

Model Keyword: HOUREMIS

Hourly emission rate file

Emissions in the hour emission rate file overwrite the emission rate specified for one or more sources. Specify the name of the external emission rate file for use with the current model scenario. Hourly emission rate files can be created using the BREEZE Hourly Emission File Editor.



Associated sources

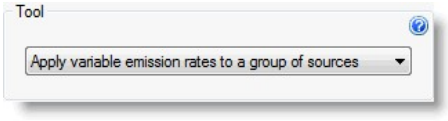
Select the sources ID's that you wish to have emission rates from the hourly emission file overwrite the emission rate specified for that sourcein the model input file.

Source Tools

This tab allows you to apply conditions (e.g., emission factors) to a group or range of sources. These tools eliminate the need to apply conditions to sources individually.

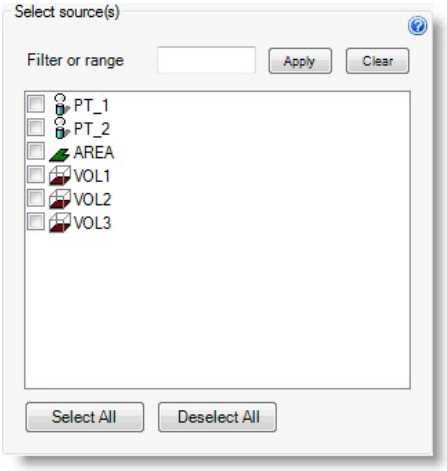
Conditions that are applied can be altered for each individual source independently in the source form without changing the conditions for all sources in a group.

Tool



Apply variable emission rates to a group of sources: Select this option to assign variable emission rates to a selected group of sources.

Select source(s)



Use your mouse to select individual model objects by clicking the box next to each model object.

Filter or range: Enter the condition you want to filter the list of sources IDs by.

Apply: Click this button to apply the filter or range specified.

Select All: Click to select all model objects displayed.

Deselect All: Click to remove the check mark from all selected model objects.

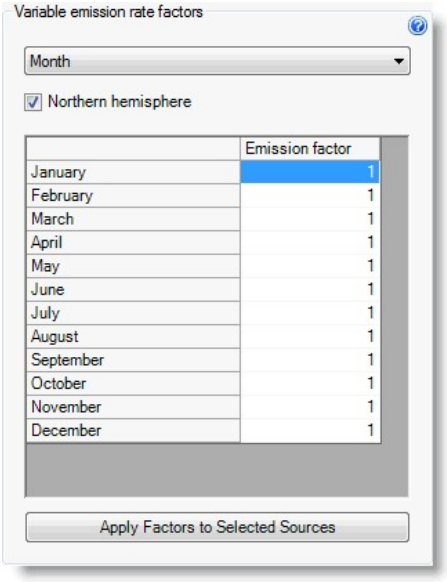
Variable emission rate factors

Used to apply emission rates that vary for a specified condition. The model provides the option of specifying variable emission rate factors for individual sources. The factors may vary on different time scales, such as by season, hour-of-day, etc.

Emission rate factors are multiplied with the source's emission rate.

An alternative method for specifying varying emission rates is through the use of the Hourly Emission File option.

Select the method you would like to vary emissions for either a single source or group of sources.



Model Keyword: EMISFACT

Emission Factor Types

Season: Option to specify an emission rate factor for each season. Enter the factor for each season. For example, winter includes December, January, and February. Total of 4 emission factors.

Month: Option to specify emission rate factors for each month. Total of 12 emission factors.

Hour of day: Option to specify emission rate factors for each hour. Total of 24 emission factors.

Wind speed: Option to specify emission rate factors for wind speed categories as defined in the meteorological form. This factor category is typically used for emissions that are a function of wind erosion.

Season and hour of day: Option to specify emission rate factors for each hour in each season. Total of 96 emission factors.

Season, hour of day, and day of week: Option to specify emission rate factors for each hour for each weekday (Monday through Friday share the same emission factor), Saturday, and Sunday in each season. Total of 288 emission factors.

Season, hour of day, and the seven days of week: Option to specify emission rate factors for each hour for seven days of the week (Monday through

Sunday can have different emission factors) in each season. Total of 672 emission factors.

Month, hour of day, and day of week: Option to specify emission rate factors for each hour for each weekday (Monday through Friday share the same emission factor), Saturday, and Sunday in each month. Total of 864 emission factors.

Month, hour of day, and the seven days of week: Option to specify emission rate factors for each hour for seven days of the week (Monday through Sunday can have different emission factors) in each month. Total of 2016 emission factors.

Emission Factor: The number of cells associated with this field varies according to what Emission Factors option is selected. For each cell, enter the factor by which the emission rate is to be varied for the current source (e.g., 1 = 100 percent of the specified emission rate; 0.75 = 75 percent of the specified rate, a 0 (zero) effectively turns the source off for that condition).

Northern hemisphere: Select this option if the emission factors are for time periods in the northern hemisphere.

Apply Factors to Selected Sources: Select this button to apply the emission factors to the selected sources.

Receptor Options

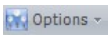
The Receptor Options form allows you to specify operations specific to receptors. To launch the Receptor Options form, choose the Receptor Options button from the Project tab

or select *Receptor Options* from the Options menu under the Model group in the other tabs.

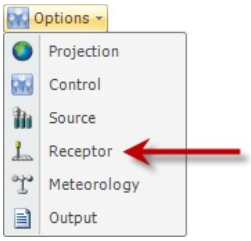
See Receptor Model Objects for information on creating receptors.

To access this form...

From the Project Tab: *Click on:*

From Other Tabs: *Click on* 

from the Model group.



Folders on the Source Options Form

Include files: External receptor data files to include in the model scenario

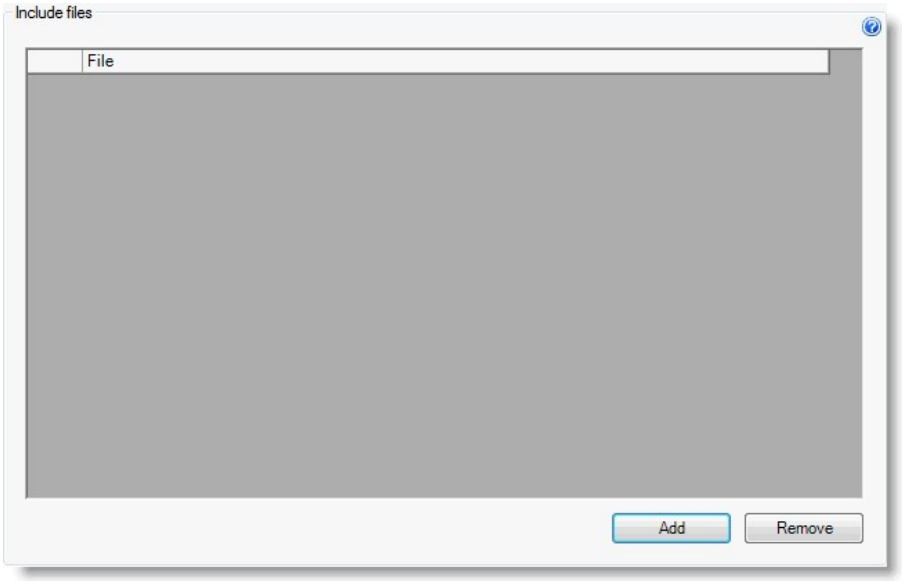
Include Files

Include files allow receptors from external files to be included into the current model scenario.

Receptor include files can contain only receptor data. The data in the included file will be processed as though it were part of the input runstream file. The contents of the included file must be valid runstream images for the receptor pathway.

If an error is generated during processing of the included file, the error message will report the line number of the included file. If more than one INCLUDED file is specified for the receptor pathway, the user will first need to determine which file the error occurred in.

Include Files



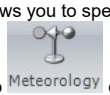
Model Keyword: INCLUDED

File: Directory path and file name of the file containing the receptor information. You can double click on the file name to manual edit it.

Add: Click on this button to select the file name you wish to include with this model run.

Remove: Click this button to remove the selected file from the list of files.

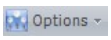
Meteorology Options

The Meteorology Options form allows you to specify operations specific to meteorological data. To launch the Meteorology Options form, choose the Meteorology Options button from the Project tab 

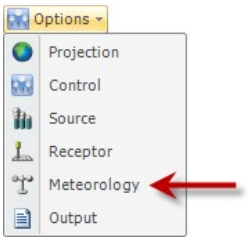
or select *Meteorology Options* from the Options menu under the Model group in the other tabs.

To access this form...

From the Project Tab: *Click on:*

From Other Tabs: *Click on* 

from the Model group.



Folders on the Meteorology Options Form

Met Files: Specify the model ready meteorological data files in this tab.

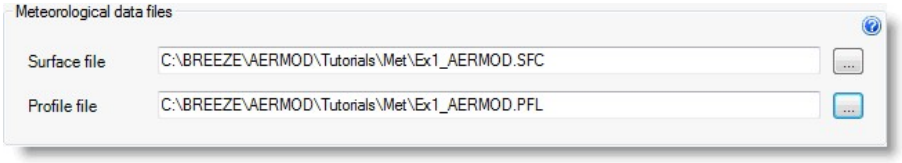
Data Period: Specify the meteorological data period to process.

Other Options: Other options related to meteorological data.

Met Files

Meteorological data files

The AERMOD model uses hourly meteorological data from separate surface and profile data files as one of the basic model inputs.



Model Keyword: SURFFILE and PROFFILE

Surface file: Click on the Browse button to select a surface meteorological data file for use in the model run.

The surface meteorological data file consists of a header record containing information on the meteorological station locations, and one record for each hour of data. These data are delimited by at least one space between each element, i.e., the data may be read as free format. The contents of the surface file are as follows:

Year
Month (1 - 12)
Day (1 -31)
Julian day (1 - 366)
Hour (1 - 24)
Sensible heat flux (W m-2)
Surface friction velocity, u* (ms-1)
Convective velocity scale, w* (ms-1)
Vertical potential temperature gradient in the 500 m layer above the planetary boundary layer
Height of the convectively-generated boundary layer (m)
Height of the mechanically-generated boundary layer (m)
Monin-Obukhov length, L (m)
Surface roughness length, z0 (m)
Bowen ratio
Albedo
Wind speed (ms-1) used in the computations
Wind direction (degrees) corresponding to the wind speed above
Height at which the wind above was measured (m)
Temperature (K) used in the computations
Height at which the temperature above was measured (m)
Precipitation code
Precipitation amount (mm)
Relative humidity (%)
Station pressure (mb)
Cloud cover (tenths)

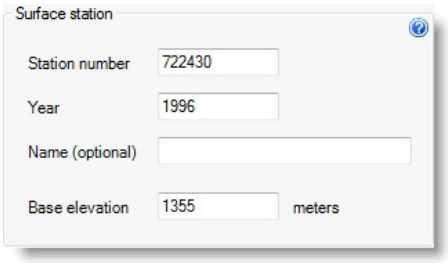
The sensible heat flux, Bowen ratio and albedo are not used by the AERMOD model, but are passed through by AERMET for information purposes only.

Profile file: Click on the Browse button to select a profile meteorological data file for use in the model run.

The profile meteorological data file consists of one or more records for each hour of data. As with the surface data file, the data are delimited by at least one space between each element and may be read as Fortran free format. The contents of the profile meteorological data file are as follows:

Year
Month (1 - 12)
Day (1 -31)
Hour (1 - 24)
Measurement height (m)
Top flag = 1, if this is the last (highest) level for this hour, 0, otherwise
Wind direction for the current level (degrees)
Wind speed for the current level (ms-1)
Temperature at the current level (K)
Standard deviation of the wind direction, F2 (degrees)
Standard deviation of the vertical wind speed, Fw (ms-1)

Surface station



Model Keyword: SURFDATA

Station number: Select this field to enter the surface station ID number (e.g., the WBAN number for NWS stations). This information will be read directly from the meteorological data file if it is available. The AERMOD model compares the station number input with the numbers included in the header record of the surface meteorological data file, and issues non-fatal warning messages if there are any mismatches.

Year: Select this field to enter the year that meteorological data were collected. If the correct file format is selected, this information will be read directly from the meteorological data file (this year applies to the upper air station as well).

Name (optional): You can provide an optional name for the station for informational purposes only.

Elevation: Since potential temperature is dependent on the elevation above mean sea level (MSL) you must enter the base elevation of the surface station in meters. The AERMOD model generates a gridded vertical profile of potential temperatures for use in the plume rise calculations. The base elevation should correspond with the base elevation of the primary meteorological tower. The primary tower is usually considered the on-site tower if onsite data is included in the meteorological data. Model Keyword: PROFBASE

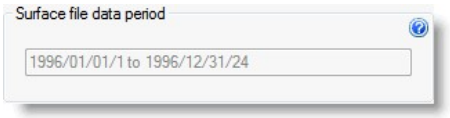
Surface file data period

Displays the period of hourly meteorological data contained in the Surface data file. This field is for informational purposes only and can not be edited. The date format is:

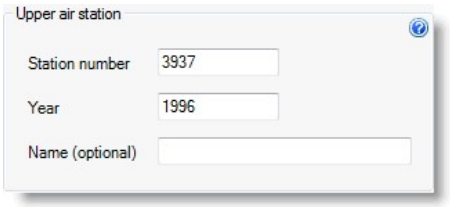
YYYY/MM/DD/HH

where:

YYYY = four digit year
MM = two digit month
DD = two digit day
HH = hour



Upper air station



Model Keyword: UAIRDATA

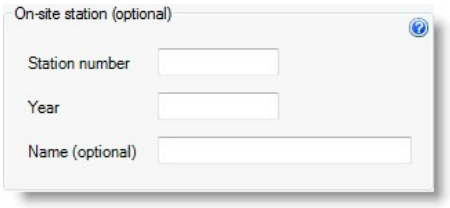
Station number: Select this field to enter the upper station ID number (e.g., the WBAN number for NWS stations). This information will be read directly from the surface meteorological data file if it is available. The AERMOD model compares the station number input with the numbers included in the header record of the surface meteorological data file, and issues non-fatal warning messages if there are any mismatches.

Year: Select this field to enter the year that meteorological data were collected. If the correct file format is selected, this information will be read directly from the surface meteorological data file.

Name (optional): You can provide an optional name for the upper air station for informational purposes only.

On-site station

On-site station information is for informational purposes only.



Model Keyword: SITEDATA

Station number: Select this field to enter the onsite station ID number. This information needs to be entered in manually as it is not read from the surface meteorological file.

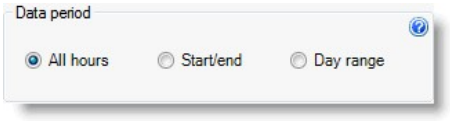
Year: Select this field to enter the year that meteorological data were collected. If the correct file format is selected, this information will be read directly from the surface meteorological data file.

Name (optional): You can provide an optional name for the on-site meteorological station for informational purposes only.

Data Period

Select the Data Period tab from the Meteorology Options screen to select the meteorological period (i.e., the number of hours) to model.

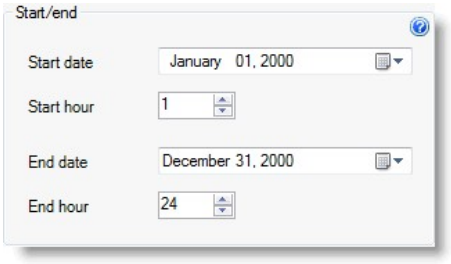
Data Period



All hours: Select this option to process all the hourly data in the surface meteorological data file.

Start/end: (Model Keyword: STARTEND) Select this option to specify a starting and ending month, day, year, and hour if you do not wish to use all of the meteorological data in the meteorological file. Any records in the data file that occur before the start date are ignored, as are any records in the data file that occur after the end date. once the end date has been reached, the model does not read any more data from the meteorological file.

When the Start/end option is selected, the following fields are displayed:



Start date: Type the start date or click the drop down list box to select a specific calendar day.

Start hour: Specify the starting hour you would like to start computing results for.

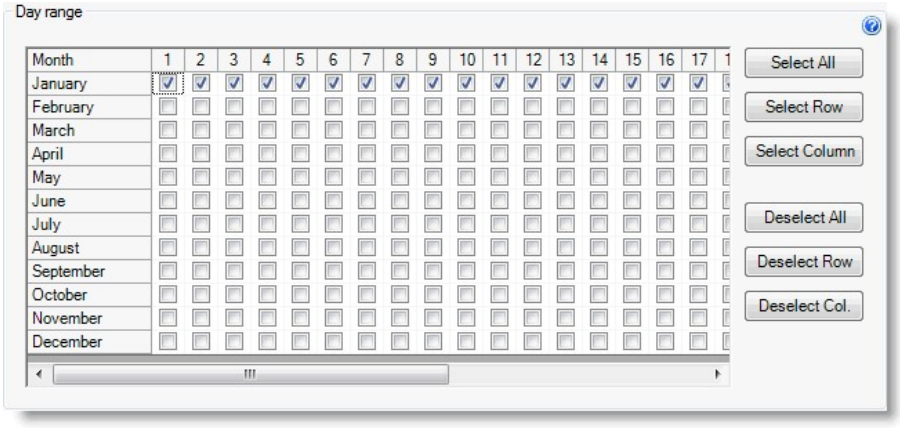
End date: Type the end date or click the drop down list box to select a specific calendar day.

End hour: Specify the ending hour you would like to end computing results for.

Day range: (Model Keyword: DAYRANGE) Select this option to specify individual days or ranges of days.

When the Day range option is selected, the following fields are displayed. Use your left mouse button to select the days you wish to model. The buttons on the right of the form allow you to select groups of days in a single click.

The following image results in a model run that generates results for the month of January.

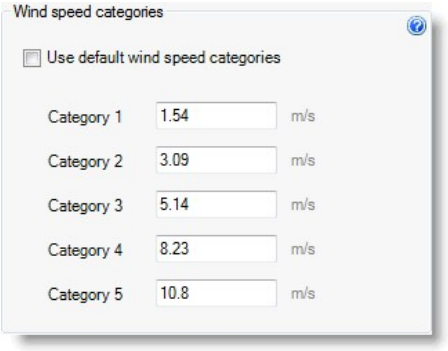


Other Options

Wind speed categories

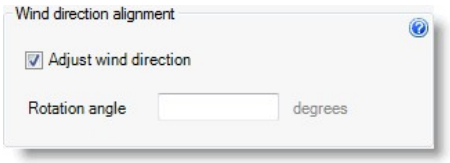
Source emission rates can vary by wind speed. The model uses six wind speed categories that are defined by the upper bound wind speed for the first five categories (the sixth category is assumed to have no upper bound). The default values for the wind speed categories are as follows: 1.54, 3.09, 5.14, 8.23, and 10.8 m/s.

The upper bounds of each wind speed category can be changed by typing in the desired value in meters/sec. To use the default wind speed categories, click on the Use default wind speed categories check box.



Wind direction alignment

If the meteorological data must be corrected for wind direction alignment problems, enter the number of degrees by which all input wind directions or flow vectors should be rotated into the Rotation Angle text box. The ISCST3 model uses the flow vector (the direction toward which the wind is blowing) as a model input parameter while the AERMOD model uses the wind direction (from which the wind is blowing). Thus, if the meteorological input data provides wind direction (the direction from which the wind is blowing), and you are using the ISCST3 model, you can convert to flow vectors by entering 180 as the wind rotation angle.



SCIM Option

Model Keyword: SCIM

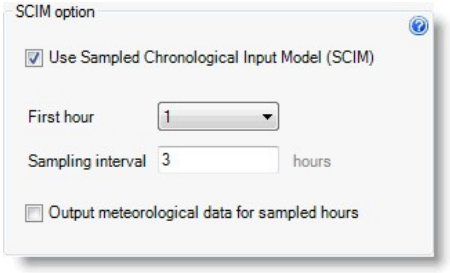
The Sample Chronological Input Model (SCIM) option is enabled only when the Non-regulatory Toxics Control option is selected.

This option is used only with the Annual average option to reduce runtime by sampling meteorology at a user specified regular interval.

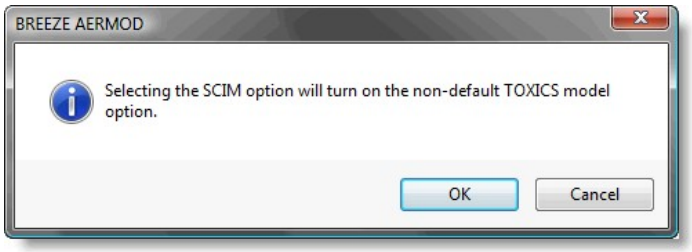
When the Toxics option is specified, the area source integration routine is optimized to reduce model runtime. This is accomplished by incorporation of a three-tiered approach using the Romberg numerical integration, a 2-point Gaussian Quadrature routine for numerical integration, or a point source approximation based on the location of the receptor relative to the source. In the regulatory default mode the Romberg numerical integration is utilized for all receptors.

If the non-default Toxics option is specified, the user may also use the SCIM option to reduce model runtime. The SCIM option can only be used with the ANNUAL average option, and is primarily applicable to multi-year model simulations. The approach used by the SCIM option is to sample the meteorological data at a user-specified regular interval to approximate the long-term (i.e., ANNUAL) average impacts.

Note: More information on this topic can be found in the U.S. EPA AERMOD User's Guide.



If the SCIM Option is selected but the non-regulatory default Toxics option is not, BREEZE will alert you with the following option.



Output Options

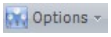
Output options are used to specify the type of output you want generated by the model. To launch the Output Options form, choose the Control Options button from the Project tab

or select *Control Options* from the Options menu under the Model group in the other tabs.

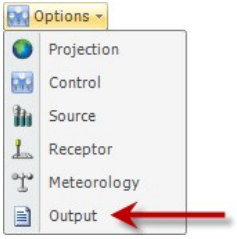
There are a number of data files that can be created.

To access this form...

From the Project Tab: *Click on:*

From Other Tabs: *Click on* 

from the Model group.



Folders on the Output Options Form

Options: The Options tab allows the user to select the type of output data desired.

Tables: The Table tab provides options to generate data tables within the main model output file.

Plot Files: Plot files are external to the main model output file and can be used to generate contour plots within Analyst and 3DAnalyst.

Post Files: Post files are external to the main model output file and can be used to generate time series plots within Analyst and 3DAnalyst.

Max Files: The Max file allows the user the option to generate a file or files of threshold violations for specific source group and averaging period combinations.

Toxx Files: This file type produces unformatted (binary) files of raw results above a threshold value with a special structure for use with the TOXX model component of TOXST.

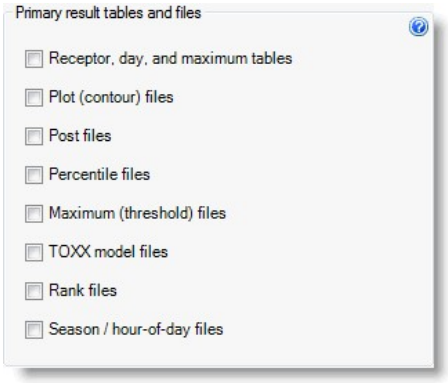
Rank Files: This file type outputs values by rank for use in Q-Q (quantile) plots.

Season/Hour Files: The Season / Hour file option is used to output a file containing the average results by season and hour-of-day.

Options

Primary result tables and files

Select the type of results you desire. A folder will be displayed for each option selected. Click on each folder to provide detailed output options.



Receptor, day, and maximum tables:

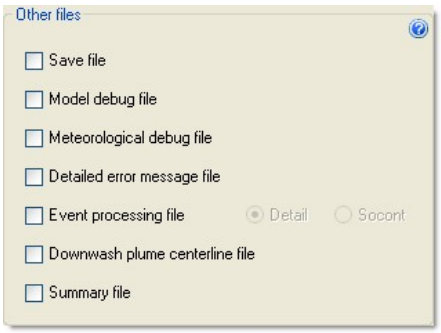
Receptor: (Model Keyword: RECTABLE) Specifies the selection of high value by receptor table output options.

Day: (Model Keyword: DAYTABLE) Specifies the selection of overall maximum value table output options.

Maximum: (Model Keyword: MAXTABLE) Specifies the selection of printed results (by receptor) for each day of data processed (this option can produce very large files and such be used with care).

Other files

AERMOD can generate a number of "other" output files. These file types are described below.



Generate save file: (Model Keyword: SAVEFIL) Check this option to save intermediate results in an unformatted file so that you can restart a model run in the event of a power failure or user interrupt. A save file will be created with the same name as the input file and a .ams file extension. (Not an option with the BREEZE Enhanced multi-scenario processor (MSP). To restart a model run using the save file, use the Restart option in the Control Options form.

Generate model debug file: (Model Keyword: DEBUGOPT MODEL) Select this option to create a file that includes intermediate calculations related to the model results for each source and receptor, e.g., dispersion parameters, plume heights, etc. These files should be used with caution as they can become very large. They are often used for specific source and receptor combinations for a specific meteorological period (e.g., hour). If the file is too large, it will not be possible to view the file in the Reports view. It will have to be extracted from the .amz file and viewed with a text editor such as Notepad.

Generate meteorological debug file: (Model Keyword: DEBUGOPT METEOR) Select this option to create a file that includes the gridded profiles of meteorological variables for each hour of data. These files should be used with caution as they can become very large. If the file is too large, it will not be possible to view the file in the Reports view. It will have to be extracted from the .amz file and viewed with a text editor such as Notepad.

Generate detailed error message file: (Model Keyword: ERRORFIL) Select this option to create a detailed listing file of all the messages generated by the model. This includes the error and warning messages that are listed as part of the message summaries provided in the main output file, and also any

informational messages (such as occurrences of calm winds) and quality assurance messages that are generated.

Generate event processing file: (Model Keyword: EVENTFIL) Check this option if you want to create an event file to perform source contribution analyses for short-term average events. If checked, AERMOD model run will generate an input file for event processing. The name of this event input file is set as "Event input file" by default. The event run output file will contain detailed the source contribution information summaries. (Not an option with the BREEZE Enhanced multi-scenario processor - MSP.)

Detail: Select this option to to produce basic source contributi on information. Provides the hourly average concentration (or total deposition) values for each source for every hour in the averaging period, and a summary of the hourly meteorological data for the event period. In general, the this option produces a larger output file than the Source contribution option, especially if there are a large number of sources.

Source contribution: Select this option to produce only the source contribution information in the output file. Provides the average concentration (or total deposition) value (i.e., the contribution) from each source for the period corresponding to the event for the source group.

Generate downwash plume centerline file: This option will generate results when the BREEZE Enhanced Fortran executable is selected in the Control Options form. It will create data for point source types (Point, Flare, Capped Point, Horizontal Point) when they are influenced by building downwash. This data can be plotted using the BREEZE Downwash Analyst application available from the Tools menu item.

Summary file: Model Keyword: SUMMFILE - Available only when the 09292 AERMOD executable is selected. This option is used to generate a separate formatted output file containing the summary of high ranked values included at the end of the standard 'aermod.out' file.

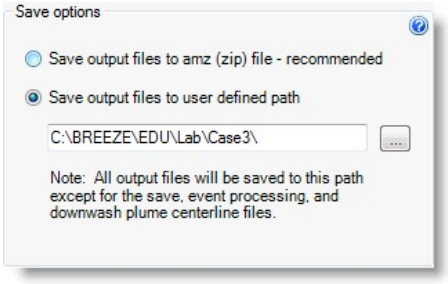
File format

Model Keyword: FILEFORM

This option is only displayed if the 09292 AERMOD executable is selected.

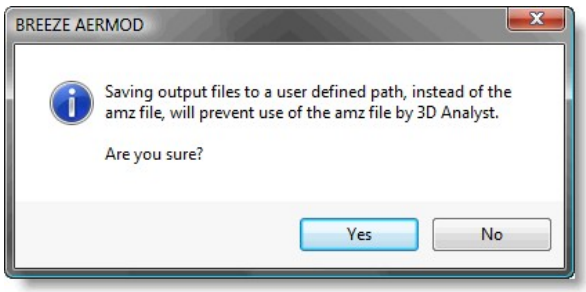
The user can specify the use of exponential notation, rather than fixed format for results that are output to separate result files. The format specified on this optional keyword is applicable to Plot files, plot-formatted Post files, Maximum (threshold) files, Rank files, and Season / hour-of-day files, but will not affect the format of results in the standard 'aermod.out' file or the Summary file. This option may be useful to preserve precision in applications with relatively small impacts, especially for the purpose of post-processing hourly concentrations using the Post file option. The option may also be useful for applications with relatively large impacts that may overflow the Fortran format specifier of F13.5 used for fixed-formatted outputs

Save Options


Save options
Save output files to amz (zip) file - recommended
Save output files to user defined path
C:\BREEZE\EDU\Lab\Case3\
...
Note: All output files will be saved to this path except for the save, event processing, and downwash plume centerline files.

Save output files to amz (zip) file - recommended: BREEZE will create a compressed .amz file that stores all the input and output files associated with the current model scenario. This is the preferred method as it makes it easy to transport (e.g., send via email) and store model scenarios. Files stored using in the .amz format can be extracted using the BREEZE Zip File Manager utility available from the Tools menu item and post processed with BREEZE 3D Analyst.

Save output files to user defined path: This option allows the user to define a directory and pathway to save model output files to. If this option is selected, output results will not be stored in the .amz file which is used to view model results in BREEZE 3D Analyst. The following informational message is displayed when this option is selected.

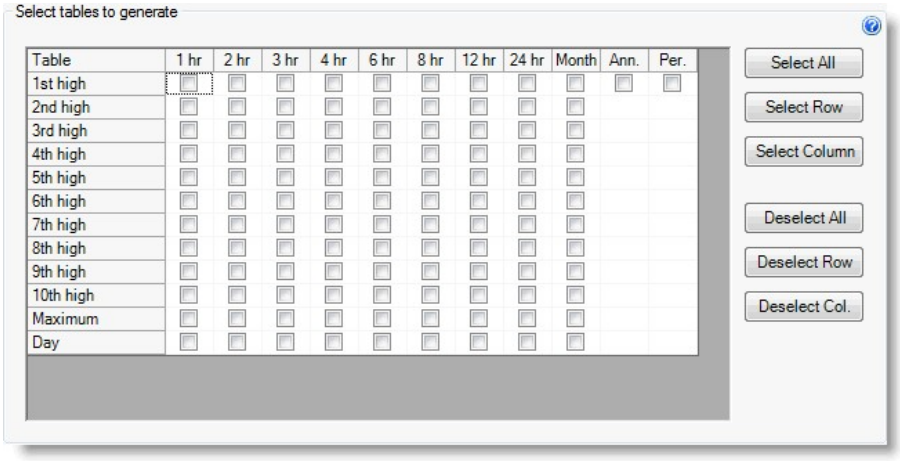

BREEZE AERMOD
Saving output files to a user defined path, instead of the amz file, will prevent use of the amz file by 3D Analyst.
Are you sure?
Yes
No

Tables

The Table tab provides options to generate data tables within the main model output file.

Results Summary Table

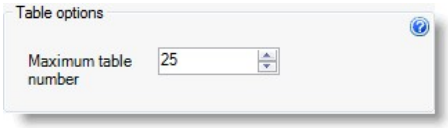
This table displays a matrix of check boxes that allow you to select the averaging periods and high values you wish to create summary tables in the output list file. One table will be created for each source group modeled in the output list file.



1st high - 10th high: (Model Keyword: RECTABLE) For the averaging period desired (1, 2, 3, 4, 6, 8, 12, 24, Month, Ann, Per.), place a check mark in the box you wish to create a summary table for each source group modeled. The following is an example of the summary table output for a Cartesian receptor grid:

```
                    *** THE   1ST HIGHEST  1-HR AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP:  ALL      ***
                        INCLUDING SOURCE(S):      STACK1  ,

                         *** NETWORK ID: GRD1     ;  NETWORK TYPE: GRIDCART ***

                             ** CONC OF OTHER    IN MICROGRAMS/M**3                        **

 Y-COORD  |                                          X-COORD (METERS)
 (METERS) |          0.00                 300.00                600.00                900.00                1200.00
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

   1500.0 |     9.04546 (96011309)     8.14545 (96011306)     8.17488 (96010709)     6.06067 (96010717)     4.97647 (96010716)
   1200.0 |    10.39284 (96011512)     9.49138 (96011305)     7.48443 (96010710)     7.57484 (96010716)     2.45247 (96010713)
    900.0 |    15.11901 (96011512)     7.36920 (96010707)     8.47211 (96010711)     4.23988 (96010713)     0.34868 (96010713)
    600.0 |    19.17623 (96011512)    14.16773 (96010715)     8.02812 (96010713)     0.16239 (96010713)     0.06045 (96010607)
    300.0 |    29.95226 (96011611)     9.56342 (96010713)     0.22961 (96011613)     0.11152 (96011613)     0.06757 (96010607)
      0.0 |     0.00000 (00000000)     1.22100 (96011614)     0.28997 (96011613)     0.12423 (96011613)     0.07041 (96010607)
   -300.0 |     7.29968 (96010204)     0.59927 (96011614)     0.22960 (96011613)     0.11152 (96011613)     0.06757 (96010607)
   -600.0 |    21.51884 (96010213)     8.50234 (96010217)     0.14034 (96011613)     0.08573 (96011613)     0.06045 (96010607)
   -900.0 |    20.07209 (96010213)    16.16407 (96010217)     2.29027 (96010217)     0.06499 (96010607)     0.05175 (96010607)
  -1200.0 |    16.21263 (96010213)    13.11102 (96010215)    13.05875 (96010217)     0.43493 (96010217)     0.04357 (96011009)
  -1500.0 |    12.96451 (96010213)    12.57152 (96010215)    16.17444 (96010217)     3.94342 (96010217)     0.11782 (96010217)
```

Maximum: (Model Keyword: MAXTABLE) Select the averaging periods you wish to create a table of the overall maximum values for each source group. The **Maximum table number** is used to specify the number of maximum values to print out.



The following is an example of the table output for the 25 maximum concentrations for the 1 hour averaging period for the source group called ALL:

```
                        *** THE MAXIMUM   25   1-HR AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP:  ALL      ***
                            INCLUDING SOURCE(S):    STACK1  ,

                                ** CONC OF OTHER    IN MICROGRAMS/M**3                        **

RANK         CONC     (YYMMDDHH) AT      RECEPTOR (XR,YR) OF TYPE    RANK         CONC     (YYMMDDHH) AT      RECEPTOR (XR,YR) OF TYPE
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
   1.      31.87809 (96010116) AT (   -300.00,       0.00)  GC       14.      25.35081 (96010609) AT (   -300.00,     300.00)  GC
   2.      31.76202 (96011010) AT (   -300.00,     300.00)  GC       15.      25.31709 (96011819) AT (   -300.00,     300.00)  GC
   3.      31.02237 (96010118) AT (   -300.00,       0.00)  GC       16.      25.24916 (96011715) AT (   -300.00,     300.00)  GC
   4.      30.76626 (96010113) AT (   -300.00,       0.00)  GC       17.      24.91418 (96011624) AT (   -300.00,     300.00)  GC
   5.      29.95226 (96011611) AT (      0.00,     300.00)  GC       18.      24.26423 (96010610) AT (   -300.00,     300.00)  GC
   6.      28.89158 (96011515) AT (   -300.00,       0.00)  GC       19.      23.98120 (96011814) AT (   -300.00,     300.00)  GC
   7.      28.63414 (96010115) AT (   -300.00,       0.00)  GC       20.      23.97859 (96011620) AT (   -300.00,     300.00)  GC
   8.      28.37915 (96010119) AT (   -300.00,       0.00)  GC       21.      23.82734 (96010508) AT (   -300.00,     300.00)  GC
   9.      28.04999 (96010607) AT (   -300.00,     300.00)  GC       22.      23.56269 (96011905) AT (   -300.00,     600.00)  GC
  10.      27.65158 (96010114) AT (   -300.00,       0.00)  GC       23.      23.39659 (96010524) AT (   -300.00,     600.00)  GC
  11.      27.07024 (96011009) AT (   -600.00,     300.00)  GC       24.      23.29682 (96011613) AT (      0.00,     300.00)  GC
  12.      26.93439 (96010117) AT (   -300.00,       0.00)  GC       25.      23.27702 (96011621) AT (   -600.00,     300.00)  GC
  13.      26.08555 (96011604) AT (   -600.00,     300.00)  GC

 *** RECEPTOR TYPES:  GC = GRIDCART
                      GP = GRIDPOLR
                      DC = DISCCART
                      DP = DISCPOLR
```

Day: (Model Keyword: DAYTABLE) Specifies the selection of printed results (by receptor) for each averaging period of each day of data processed (this option can produce very large files and such be used with care). The following is an example of the table output for a Cartesian receptor grid:

```
                *** CONCURRENT  3-HR AVERAGE CONCENTRATION   VALUES ENDING WITH HOUR 12 FOR DAY   4 OF 1996 ***
                    FOR SOURCE GROUP: ALL
                    INCLUDING SOURCE(S):      STACK1  ,

                              *** NETWORK ID: GRD1     ;  NETWORK TYPE: GRIDCART ***

                                  ** CONC OF OTHER    IN MICROGRAMS/M**3                        **

   Y-COORD  |                                                X-COORD (METERS)
   (METERS) |     -1500.00     -1200.00      -900.00      -600.00      -300.00         0.00       300.00       600.00       900.00
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

  1500.00 |      0.32655      0.27065      0.13854      0.03233      0.00780      0.00732      0.00705      0.00636      0.00546
  1200.00 |      0.42955      0.48931      0.37227      0.12203      0.01501      0.01122      0.01059      0.00906      0.00732
   900.00 |      0.41470      0.66024      0.82586      0.51211      0.05547      0.01945      0.01759      0.01369      0.01002
   600.00 |      0.24994      0.52824      1.11899      1.72670      0.51735      0.04180      0.03394      0.02176      0.01369
   300.00 |      0.07221      0.16826      0.49631      1.94080      5.83496      0.13695      0.07799      0.03394      0.01759
     0.00 |      0.01113      0.01754      0.03124      0.06853      0.21961      0.00000      0.13681      0.04179      0.01945
  -300.00 |      0.00706      0.01059      0.01759      0.03394      0.07799      0.13681      0.07799      0.03394      0.01759
  -600.00 |      0.00636      0.00906      0.01369      0.02176      0.03394      0.04179      0.03394      0.02176      0.01369
  -900.00 |      0.00546      0.00732      0.01002      0.01369      0.01759      0.01945      0.01759      0.01369      0.01002
 -1200.00 |      0.00458      0.00579      0.00732      0.00906      0.01059      0.01122      0.01059      0.00906      0.00732
 -1500.00 |      0.00379      0.00458      0.00546      0.00636      0.00705      0.00732      0.00705      0.00636      0.00546
```

Plot / Contour Files

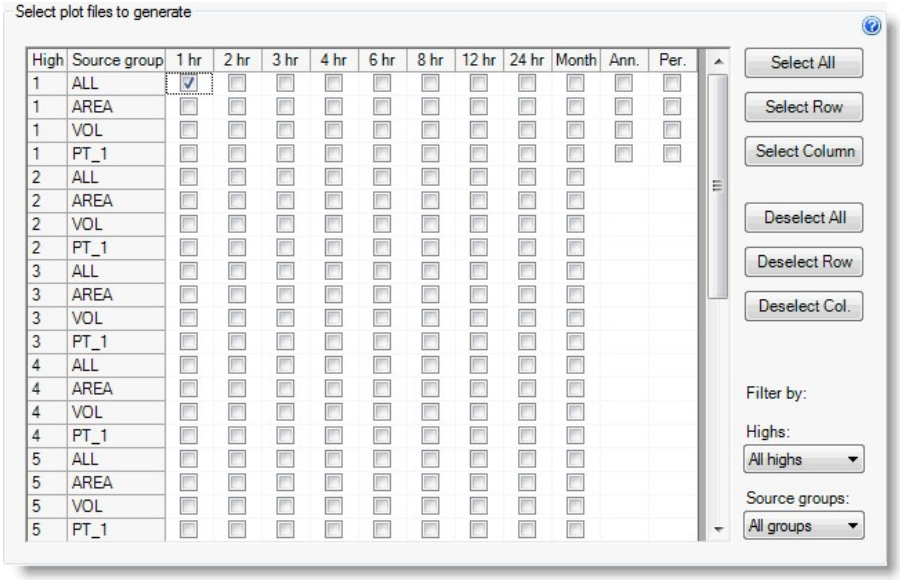
Plot files are external to the main model output file and can be used to generate contour plots within Analyst and 3DAnalyst.

Plot / Contour Files

Model Keyword: PLOTFILE

This table displays a matrix of check boxes that allow you to select the averaging periods, high values, and source groups you wish to create files for that contain summary results that can easily be imported into various graphics packages.

In version 7.x of BREEZE, when using the non-enhanced version of the dispersion model (e.g., EPA's AERMOD), plot files must be selected to generate contour plots within BREEZE 3DAnalyst.



High: This column represents the high value for each of the source groups and averaging periods in the respective row. A 1 would represent the 1st highest value at each receptor.

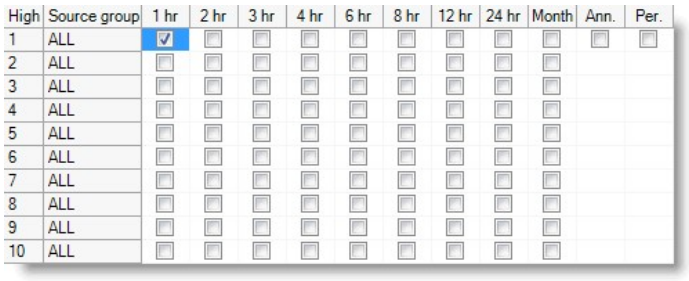
Source group: This column represents the source group for the respective High value and averaging period.

1 hr - 24 hr; Month: These columns represent the averaging period for the respective High value and Source group.

Ann.; This column should be selected to generate a plot file of the annual average results. The first high value is the only option for this averaging period. A full year of meteorological data must be processed if the Annual averaging period is selected.

Per.: This column should be selected to generate a plot file of the period average results. The period average is an average of all the meteorological periods processed.

Filter by: To simplify the display of check boxes, you can filter the table by High values and by Source groups. Use the drop down boxes to select the High value and / or Source group you would like to display check boxes for. For example, the following image displays the table shown above filtered for source group All.



High	Source group	1 hr	2 hr	3 hr	4 hr	6 hr	8 hr	12 hr	24 hr	Month	Ann.	Per.
1	ALL	☑	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
2	ALL	☐	☐	☐	☐	☐	☐	☐	☐	☐		
3	ALL	☐	☐	☐	☐	☐	☐	☐	☐	☐		
4	ALL	☐	☐	☐	☐	☐	☐	☐	☐	☐		
5	ALL	☐	☐	☐	☐	☐	☐	☐	☐	☐		
6	ALL	☐	☐	☐	☐	☐	☐	☐	☐	☐		
7	ALL	☐	☐	☐	☐	☐	☐	☐	☐	☐		
8	ALL	☐	☐	☐	☐	☐	☐	☐	☐	☐		
9	ALL	☐	☐	☐	☐	☐	☐	☐	☐	☐		
10	ALL	☐	☐	☐	☐	☐	☐	☐	☐	☐		

The resulting formatted Plot file(s) includes several records with header information identifying the averaging period, source group and high value number of the results, and then a record for each receptor which contains the x and y coordinates for the receptor location, the appropriate high value at that location, and the averaging period, source group and high value number. An example of the Plot file out is presented below:

```
* AERMOD (07026):  This is my first AERMOD run
* MODELING OPTIONS USED:
*  CONC                              DFAULT ELEV
*          PLOT FILE OF  HIGH 1ST  HIGH  1-HR VALUES FOR SOURCE GROUP: ALL
*          FOR A TOTAL OF   121 RECEPTORS.
*          FORMAT: (3(1X,F13.5),3(1X,F8.2),3X,A5,2X,A8,2X,A4,6X,A8,2X,I8)
*        X             Y       AVERAGE CONC     ZELEV    ZHILL    ZFLAG    AVE      GRP       HIVAL    NET ID   DATE(CONC)
*  _____________ _____________ _____________ _____ _____ _____ ____ ________ ________ ________ ________
   -1500.00000   -1500.00000       6.21721   0.00  0.00  0.00  1-HR ALL      1ST      GRD1     96010110
   -1200.00000   -1500.00000       5.63058   0.00  0.00  0.00  1-HR ALL      1ST      GRD1     96010110
    -900.00000   -1500.00000       7.59283   0.00  0.00  0.00  1-HR ALL      1ST      GRD1     96010203
    -600.00000   -1500.00000       4.63184   0.00  0.00  0.00  1-HR ALL      1ST      GRD1     96010208
    -300.00000   -1500.00000      12.79046   0.00  0.00  0.00  1-HR ALL      1ST      GRD1     96010212
       0.00000   -1500.00000      12.96451   0.00  0.00  0.00  1-HR ALL      1ST      GRD1     96010213
     300.00000   -1500.00000      12.57152   0.00  0.00  0.00  1-HR ALL      1ST      GRD1     96010215
     600.00000   -1500.00000      16.17444   0.00  0.00  0.00  1-HR ALL      1ST      GRD1     96010217
     900.00000   -1500.00000       3.94342   0.00  0.00  0.00  1-HR ALL      1ST      GRD1     96010217
    1200.00000   -1500.00000       0.11782   0.00  0.00  0.00  1-HR ALL      1ST      GRD1     96010217
    1500.00000   -1500.00000       0.03207   0.00  0.00  0.00  1-HR ALL      1ST      GRD1     96011009
   -1500.00000   -1200.00000       6.62044   0.00  0.00  0.00  1-HR ALL      1ST      GRD1     96011022
   -1200.00000   -1200.00000       3.32582   0.00  0.00  0.00  1-HR ALL      1ST      GRD1     96010110
    -900.00000   -1200.00000       8.14259   0.00  0.00  0.00  1-HR ALL      1ST      GRD1     96010203
    -600.00000   -1200.00000       9.16870   0.00  0.00  0.00  1-HR ALL      1ST      GRD1     96010203
```

Post Files

Post files are external to the main model output file and can be used to generate time series plots within 3DAnalyst.

NOTE: BREEZE 3D Analyst now contains the Daily Maximum extraction utility which reads post files generated by the 09292 executable. This utility will extract daily maximum results from post data as part of the process of comparing results against the new EPA hourly nitrogen dioxide standard.

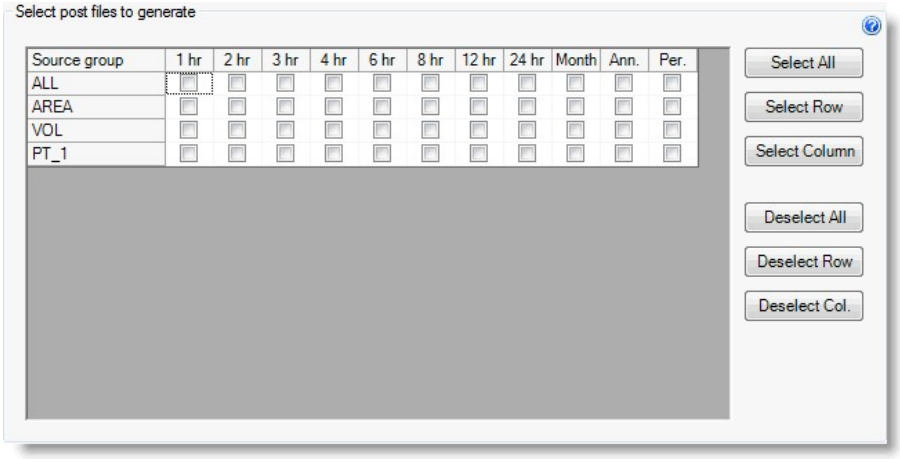
Select post files to generate

Model Keyword: POSTFILE

This table displays a matrix of check boxes that allow you to select the averaging periods and source groups you wish to create files for that contain results for each receptor for each averaging period processed.

Since results are produced for each source group, averaging period, and receptor, these files can become very large and should be used with caution. For a file of hourly values for a full year (8760 records) and 400 receptors, the resulting file will use about 14 megabytes of disk space.

Post files are used within 3DAnalyst to product time-series plots of modeled concentrations.



Source group: This column represents the source group for the averaging period.

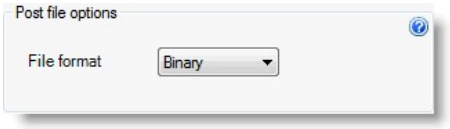
1 hr - 24 hr; Month: These columns represent the averaging period for the respective Source group.

Ann.; This column should be selected to generate a post file of the annual average results. A full year of meteorological data must be processed if the Annual averaging period is selected.

Per.: This column should be selected to generate a post file of the period average results. The period average is an average of all the meteorological periods processed.

Post file options

Post files can be created either as in ASCII or Binary format. ASCII files can be read with a text editor such as Notepad. Binary files are more compact and can not be read by a text editor. Binary files are usually post-processed by applications such as BREEZE 3D Analyst.

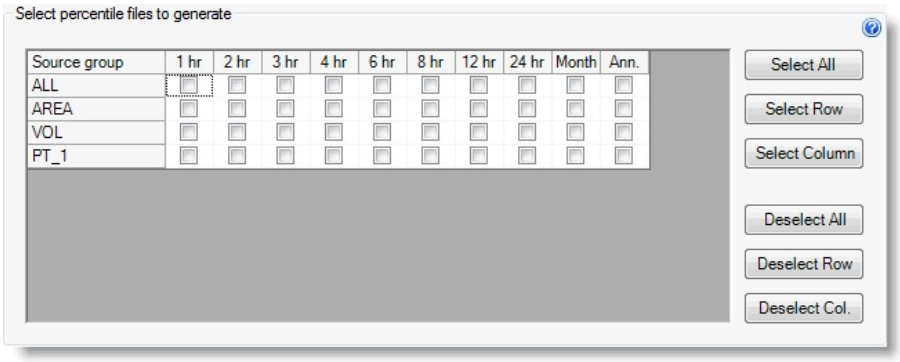


Percentiles

The Percentiles tab provides options to generate files containing concentration results corresponding to specified percentiles or high values. Results will be generated for each source group selected. When using this option, a binary Post file will automatically be created for use in computing the percentile and high values.

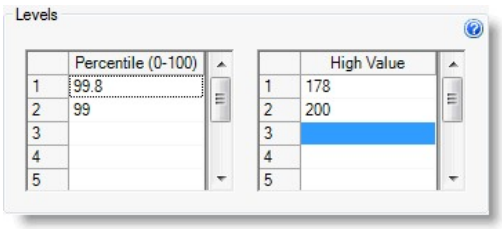
Select percentile files to generate

Click on the boxes to select the source group and averaging period combination you want to computer percentiles or high values for.



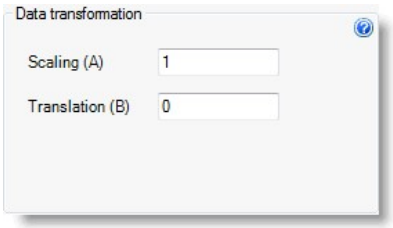
Levels

Enter the desired percentile value(s) and / or the high value(s).



Data transformation

The results can be transformed to different values by multiplying a Scaling factor and / or adding a Translation value.



Scaling (A): Multiplies concentration values by this value. For example, normalized concentration results can be multiplied (scaled) by the actual emission rate for a particular source.

Translation (B): Adds this value to the concentration value *after* any Scaling value was applied. For example, a single background concentration can be applied to all results using the Translation.

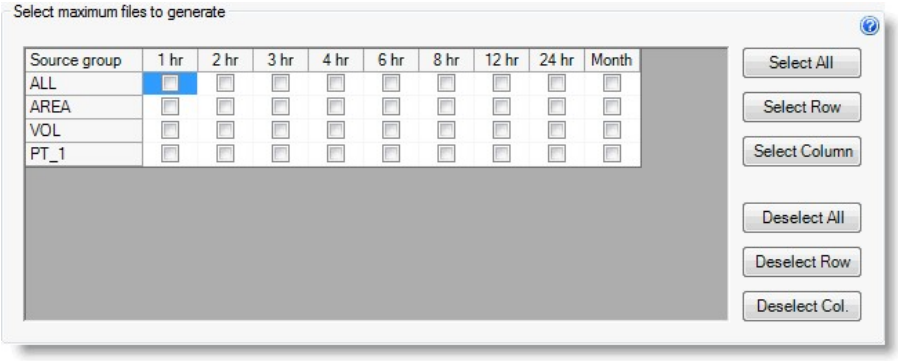
Max Files

The Max file allows the user the option to generate a file or files of threshold violations for specific source group and averaging period combinations.

Max Files

Model Keyword: MAXFILE

This table displays a matrix of check boxes that allow you to select the averaging periods and source groups you wish to create files for that contain occurrences of violations of user-specified threshold value.

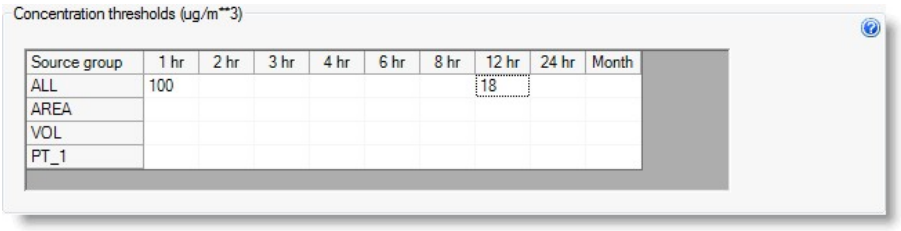


Source group: This column represents the source group for the averaging period.

1 hr - 24 hr; Month: These columns represent the averaging period for the respective Source group.

Maximum file thresholds

The below table provides a means for entering the threshold value for the source group and averaging periods specified in the above table. Enter the value in the units you have requested the output to be written out as (the default units are micrograms per cubic meter) for each cell source group and averaging period selected.



Note, in order to generate event input file with AERMOD model run, threshold concentration values have to be specified for interested source groups.

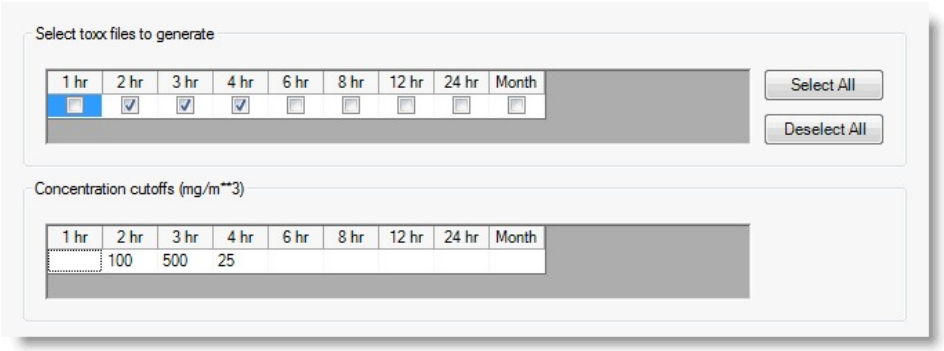
Toxx Files

TOXX Files

Model Keyword: TOXXFILE

This file type produces unformatted (binary) files of raw results above a threshold value with a special structure for use with the TOXX model component of TOXST.

NOTE: The TOXST model developed by EPA does not support these file types at this time.

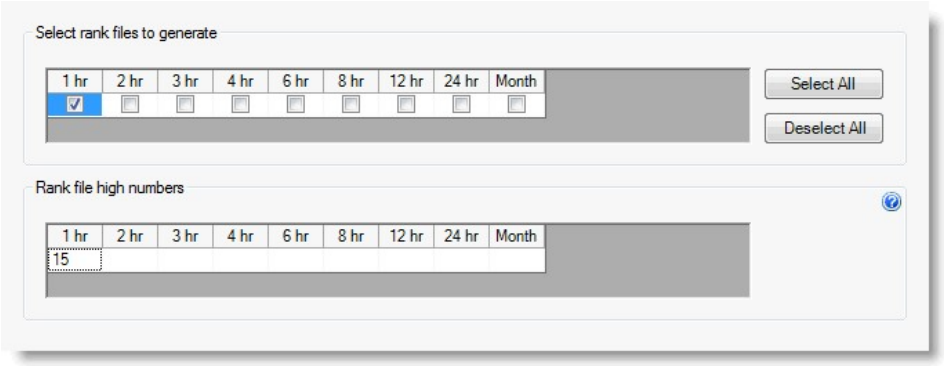


Rank Files

Rank Files

Model Keyword: RANKFILE

This file type outputs values by rank for use in Q-Q (quantile) plots. The MAXTABLE option must be specified first in order to use this file type option for a particular averaging period. However, Rank file output differs from the results in the MAXTABLE output in that duplicate date/hour occurrences are removed.



Season/Hour Files

Season/Hour Files

Model Keyword: SEASONHR

The Season / Hour file option is used to output a file containing the average results by season and hour-of-day.

Place a check mark for each source group you wish to create a file for.

An example of the output file is shown here:

```
* AERMOD (07026):  This is my first AERMOD run
* MODELING OPTIONS USED:
*  CONC                    DFAULT ELEV
*         FILE OF SEASON/HOUR VALUES FOR SOURCE GROUP: ALL
*         FOR A TOTAL OF   121 RECEPTORS.
*         FORMAT: (2(1X,F13.5),1(1X,F13.8),3(1X,F7.2),2X,A8,2X,3(I4,2X),A8)
*        X             Y       AVERAGE CONC   ZELEV   ZHILL   ZFLAG    GRP      NHRS  SEAS  HOUR   NET ID
* ____________  ____________  ____________  ______  ______  ______  ________  ____  ____  ____  ________
   -1500.00000   -1500.00000    0.00748224    0.00    0.00    0.00  ALL         20     1     1  GRD1
   -1200.00000   -1500.00000    0.00750685    0.00    0.00    0.00  ALL         20     1     1  GRD1
    -900.00000   -1500.00000    0.00831081    0.00    0.00    0.00  ALL         20     1     1  GRD1
    -600.00000   -1500.00000    0.00921041    0.00    0.00    0.00  ALL         20     1     1  GRD1
    -300.00000   -1500.00000    0.00990983    0.00    0.00    0.00  ALL         20     1     1  GRD1
       0.00000   -1500.00000    0.01017779    0.00    0.00    0.00  ALL         20     1     1  GRD1
     300.00000   -1500.00000    0.00990983    0.00    0.00    0.00  ALL         20     1     1  GRD1
     600.00000   -1500.00000    0.00921044    0.00    0.00    0.00  ALL         20     1     1  GRD1
     900.00000   -1500.00000    0.00831021    0.00    0.00    0.00  ALL         20     1     1  GRD1
    1200.00000   -1500.00000    0.00741744    0.00    0.00    0.00  ALL         20     1     1  GRD1
    1500.00000   -1500.00000    0.00665166    0.00    0.00    0.00  ALL         20     1     1  GRD1
   -1500.00000   -1200.00000    0.01349667    0.00    0.00    0.00  ALL         20     1     1  GRD1
   -1200.00000   -1200.00000    0.01012582    0.00    0.00    0.00  ALL         20     1     1  GRD1
    -900.00000   -1200.00000    0.01025869    0.00    0.00    0.00  ALL         20     1     1  GRD1
    -600.00000   -1200.00000    0.01187857    0.00    0.00    0.00  ALL         20     1     1  GRD1
```

ISC

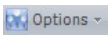
This section will discuss only those model options forms which are different in ISC mode. Projection, Source, and Receptor options remain unchanged from AERMOD mode.

Control Options

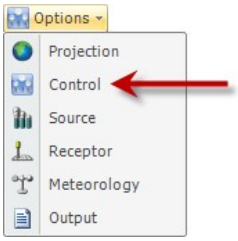
The main modeling options are input in the Control Options form. The Control Options form allows you to specify control options. To launch the Control Options form, select the Control Options button from the Project tab or select Options | Control from the Model group in other tabs (except Home)

To access this form...

From the Project Tab: *Click on:*

From Other Tabs: *Click on* 

from the Model group.



Folders on the Control Options Form

Main Options: Contains the main control options for the model

Other Options: Additional control options

Multi-year: Set up MultiYear run for PM10

Gas Deposition: Displayed when the Gaseous deposition control option is selected

Ozone: Displayed when the NO2 Pollutant ID is selected

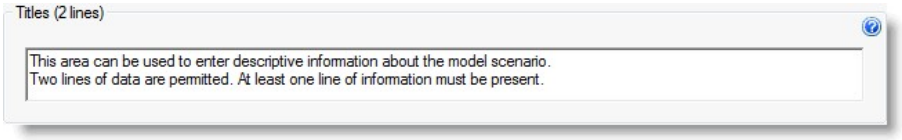
Main Options Tab

The Main Options folder is displayed whenever the Control Options screen is opened.

Titles

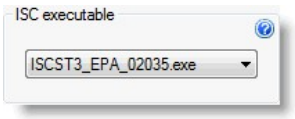
You may enter up to two lines of title information, with up to 68 characters per line. The title appears at the top of all output files for the model run. The first title is mandatory. The second title is optional.

Model Keyword: TITLEONE and TITLETWO


Titles (2 lines)
This area can be used to enter descriptive information about the model scenario.
Two lines of data are permitted. At least one line of information must be present.

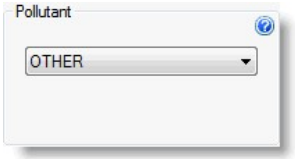
ISC Executable

Select from the most recent versions of the EPA ISC and ISC-PRIME FORTRAN executables.



Pollutants

Select the pollutant to be used in the model run from the drop-down list box. You may also type in pollutant names (see the Pollutants folder for information on storing multiple pollutants in a project file)



Model Keyword: POLLUTID

AERMOD and ISC do not model chemical reactions. The following are important notes regarding each pollutant type listed.

SO2: When Urban is selected, the source is modeled with a 4 hour half life.

NO2: Choosing this pollutant enables the optional Ozone folder.

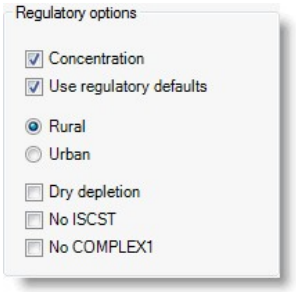
PM10 or PM-10: If either of these pollutant id's are used, the multi-year option for generating the high-sixth-high in five years will be used.

User defined: When selected, another field is displayed that allows you to specify a specific pollutant id that has a maximum of eight alphanumeric characters.

Model options

Select the check box to enable ISC-PRIME with PRIME downwash algorithms.

Regulatory options



Model Keyword: DFAULT

Concentration: Calculates pollutant concentrations in the air.

Use regulatory defaults: Turns the U.S. EPA regulatory default switch on or off. If not checked, an additional group of options is displayed on this form.

Rural: Uses rural dispersion parameters.

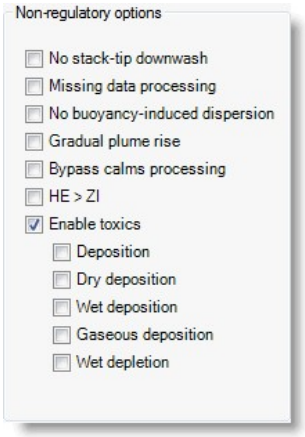
Urban: Uses urban dispersion parameters.

Dry depletion: Turns on plume depletion due to dry removal mechanisms.

No ISCST: Applies only the complex terrain algorithm and not the simple terrain algorithm

No COMPLEX1: Applies only the simple terrain algorithm and not the complex terrain algorithm.

Non-regulatory options



No stack-tip downwash: When checked, stack tip downwash calculations are not performed.

Missing data processing: Allows ISC to handle missing meteorological data when processing short-term averages.

No buoyancy-induced dispersion: Toggles off buoyancy-induced dispersion except for Schulman-Scire downwash.

Gradual plume rise: Toggles on gradual plume rise except for building downwash.

Bypass calms processing: Uses zero concentration values in calculations of short-term averages when calm hours are included in a period.

HE > ZI: Limits the plume centerline height (HE) to less than or equal to the mixing height (ZI) to avoid anomalously large concentrations due to receptors elevation falling below the stack base elevation.

Enable toxics: This option must be selected to model deposition and depletion. Model Keyword: TOXICS

Deposition: Calculates total deposition flux (i.e., sum of dry and wet deposition flux) on the ground. This option requires particle information, scavenging coefficients, and specially processed meteorological data.

Dry deposition: Calculates dry deposition flux on the ground. This option requires particle information and specially preprocessed meteorological data. When this option is selected, dry removal mechanisms (depletion) are enabled for both concentration and dry deposition flux calculations.

Wet deposition: Calculates wet deposition flux on the ground. This option requires particle information, scavenging coefficients, and specially preprocessed meteorological data. When this option is selected, wet removal mechanisms (depletion) are enabled for both concentration and wet deposition flux calculations.

Gaseous deposition: Invokes the gaseous deposition algorithms. Additional control and source parameters are required.

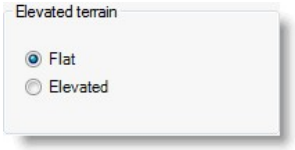
Wet depletion: Calculates plume depletion due to wet removal mechanisms.

Note: One or more of these options can be selected. All deposition options require certain source parameters and specially processed meteorological data, including: friction velocity, Monin-Obukhov length, and surface roughness length (for dry or wet deposition). Additionally, the wet deposition option requires precipitation code and precipitation rate.

Note: When particles are modeled, a settling velocity and a deposition velocity are calculated for each size category. The settling velocity causes the plume to "tilt" towards the surface (if the plume is elevated) as it travels downwind, while the deposition velocity is used to calculate the flux of matter deposited at the surface. Beginning with version 04300, the dry and/or wet removal (depletion) mechanisms (the DRYDPLT and WETDPLT options in earlier versions of AERMOD) will automatically be included in the calculated concentrations or deposition flux values if the dry and/or wet deposition processes are considered. Dry and wet removal effects on calculated concentration values can be included even if deposition flux values are not being calculated. However, the additional data requirements for dry and wet deposition must be met in order for dry and wet removal to be included in the concentration calculations.

Elevated terrain

Select to model concentrations at receptors located above (or below) stack base elevation.



Model Keyword: TERRHGTS

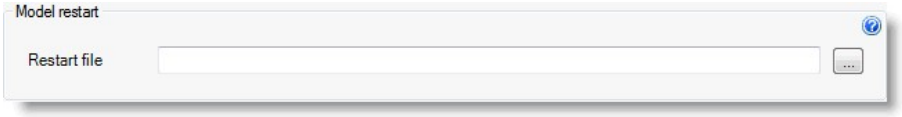
Flat: Models receptors at stack base elevation

Elevated: Uses imported elevations for model objects.

Other Options Tab

The Other Options folder contains additional control options.

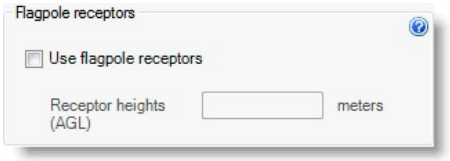
Model restart



Model Keyword: INITFILE

Restart file: Optional file that can be specified to initialize the model from a previously saved file. This option works in conjunction with the Save File option. The Save File option creates the file that is specified in this field. You do not need to use this option if you use the BREEZE enhanced save file option.

Flagpole receptors



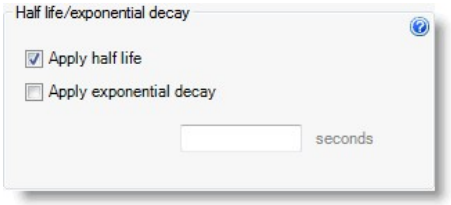
Model Keyword: FLAGPOLE

Use flagpole receptors: When checked, receptor concentrations can be modeled at a height above local ground level. If you do not select this option, any entered flagpole heights will be removed from the data file. Flagpole heights for each receptor can be specified in the receptor forms.

Receptor heights: If flagpole receptors are to be modeled, an optional default receptor height value can be specified that will be used for those receptors that do not have a flagpole receptor height.

Half life / exponential decay

The model provides the option to use exponential decay of the pollutant being modeled.



Displayed only when the regulatory default switch is not selected.

The relationship between the below parameters is Decay = 0.693/HalfLife.

Apply half life:
Model Keyword: HALFLIFE

Used to specify the half life of the pollutant being modeled for exponential decay in seconds,

Apply exponential decay:
Model Keyword: DCAYCOEF

Used to to specify the decay coefficient of the pollutant being modeled in units of s^{-1}.

Multi-year Tab

Multi-year

The 24-hour NAAQS for particulate matter with aerodynamic particle diameters of 10 microns or less (PM-10) is in the form of an expected exceedance value, which cannot be exceeded more than once per year on average over a three year period for purposes of attainment demonstrations. Modeling demonstrations of compliance with the PM-10 NAAQS are based on the High-N+1-High value over N years, or in the case of five years of NWS meteorological data, the High-6th-High (H6H) over five years. In the AERMOD model, the H6H 24-hour average over five years can be modeled in one of two ways: 1) running five individual years and combining the results using the CO MULTYEAR option, as described in Section 3.2.11 of the EPA ISC User's Guide; or 2) using a single five-year meteorological data file and specifying the SIXTH (or 6TH) highest value on the OU RECTABLE card. If applied properly, the results of these two approaches will be equivalent. The special processing consisting of the 99th percentile 24-hour value averaged over N years for PM-10 in previous versions of ISC, referred to as the "Post-1997" PM-10 option, has been removed since that standard was vacated.

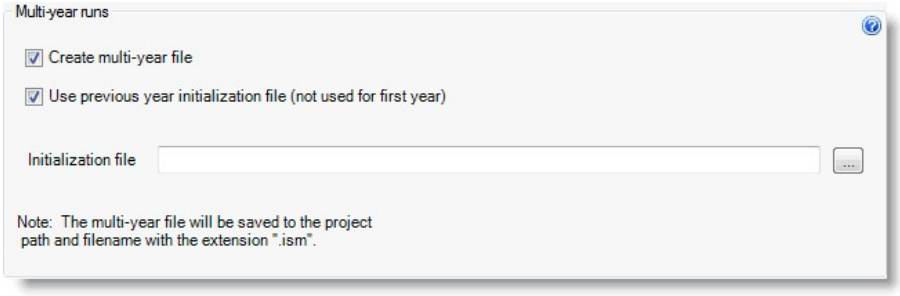
To use the first method to perform PM10 analyses according to the pre-1997 NAAQS, the user needs to specify the MULTYEAR card on the CO pathway. The syntax and type are now as follow,

Syntax: CO MULTYEAR H6H Savfil (Inifil)

where H6H is a new secondary keyword that identifies this as a pre-1997 analysis, the Savfil parameter specifies the filename for saving the results arrays at the end of each year of processing, and the Inifil parameter specifies the filename to use for initializing the results arrays at the beginning of the current year. The Inifil parameter is optional, and should be left blank for the first year in the multi-year series of runs.

When run the first year meteorological data, check the Create multi-year file check box, and leave the rest empty. A file that contains results of this run will be generated automatically. The file name will be the project name with the extension .amm.

To run the following years, check both Create multi-year file and Use previous year initialization file check boxes; select the previous .amm file for the Initialization file text field.

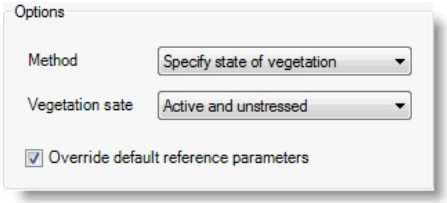

Multi-year runs
Create multi-year file
Use previous year initialization file (not used for first year)
Initialization file
Note: The multi-year file will be saved to the project path and filename with the extension ".ism".

Gas Deposition Tab

The Toxics option must be selected for this form to be enabled.

The ISC model includes an option for modeling the effects of dry deposition for gaseous pollutants as a non-default Toxics option.

Options



Method: Choose from "Specify state of vegetation" (Model Keyword: VEGSTATE) or "User-defined deposition velocity (Model Keyword: GASDEPVD).

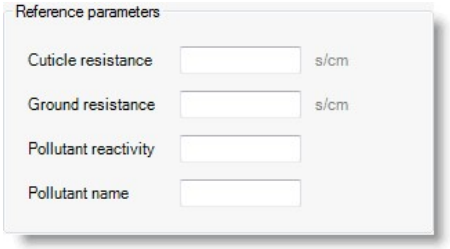
Vegetation state: Available when Method is "Specify state of vegitation". Choices are: "Active and unstressed", "Active and stressed", or "Inactive"

Depos. velocity: Available when Method is "User defined deposition velocity". Type in deposition velocity in meters per second.

Override default reference parameters: Select to provide your own Reference parameters for gas dry deposition.

Reference parameters

You can override the default values of the cuticle resistance, ground resistence, pollutant reactivity, and pollutant name.



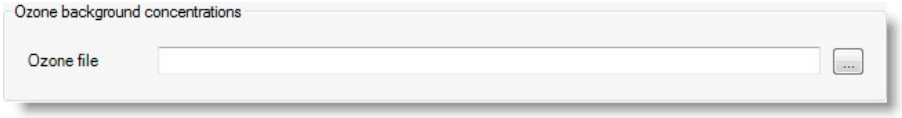
Model Keyword: GASDEPDF

Default parameters are Cuticle resistance: 30 s/cm, Ground resistance: 10 s/cm, and Pollutant reactivity: 8.

Ozone

The Pollutant ID must be set to NO2 for the Ozone folder to be enabled.

This tab allows users to input an ozone file containing background concentrations of ozone for use with the Ozone Limiting Method (OLM) in ISC for modeling the conversion of NO_x to NO_2.



Ozone file: Specify the location of the the ozone background concentration file.

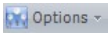
Meteorology Options

The Meteorology Options form allows you to specify operations specific to meteorological data. To launch the Meteorology Options form, choose the Meteorology Options button from the Project tab

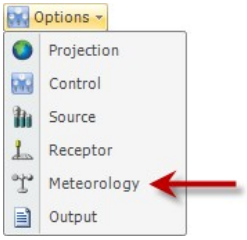
or select *Meteorology Options* from the Options menu under the Model group in the other tabs.

To access this form...

From the Project Tab: *Click on:*

From Other Tabs: *Click on* 

from the Model group.



Folders on the Meteorology Options Form

Met Files: Specify the model ready meteorological data files in this tab.

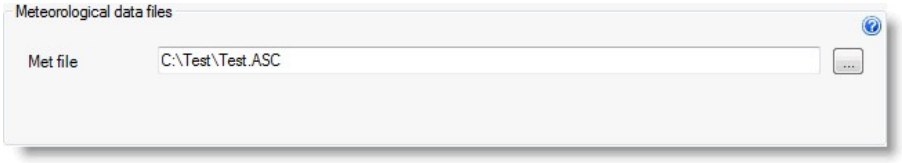
Data Period: Specify the meteorological data period to process.

Other Options: Other options related to meteorological data.

Met Files

Meteorological data files

The ISC model uses hourly meteorological data in a single file as one of the basic model inputs.

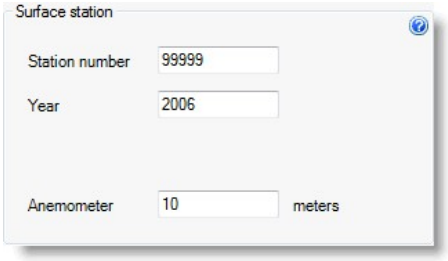


Model Keyword: INPUTFIL

For formatted ASCII file, the first record contains the surface station number, the year for surface data, the upper air station number (for mixing height data), and the year for upper air data. ASCII-formatted data have the following format:

Variable	Fortran	Columns
Year (last 2 digits)	I2	1- 2
Month	I2	3- 4
Day	I2	5- 6
Hour	I2	7- 8
Flow Vector (deg.)	F9.4	9-17
Wind Speed (m/s)	F9.4	18-26
Ambient Temperature (K)	F6.1	27-32
Stability Class (A=1, B=2, ... F=6)	I2	33-34
Rural Mixing Height (m)	F7.1	35-41
Urban Mixing Height (m)	F7.1	42-48
Friction Velocity (m/s) (Dry or Wet Deposition)	F9.4	49-57
Monin-Obukhov Length (m) (Dry or Wet Deposition)	F10.1	58-67
Surface Roughness (m) (Dry or Wet Deposition)	F8.4	68-75
Precipitation Code (00-45) (Wet Deposition Only)	I4	76-79
Precipitation Rate (mm/hr) (Wet Deposition Only)	F7.2	80-86

Surface station



Model Keyword: SURFDATA

Station number: Select this field to enter the surface station ID number (e.g., the WBAN number for NWS stations). This information will be read directly from the meteorological data file if it is available. The ISC model compares the station number input with the numbers included in the header record of the meteorological data file, and issues non-fatal warning messages if there are any mismatches.

Year: Select this field to enter the year that meteorological data were collected. If the correct file format is selected, this information will be read directly from the meteorological data file (this year applies to the upper air station as well).

Anemometer: Since ISC adjusts wind speeds from the anemometer height to the release height, the accurate specification of anemometer height is important to obtaining the correct model results. Model Keyword: ANEMHGHT

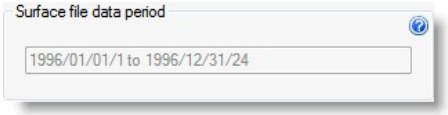
Surface file data period

Displays the period of hourly meteorological data contained in the Surface data file. This field is for informational purposes only and can not be edited. The date format is:

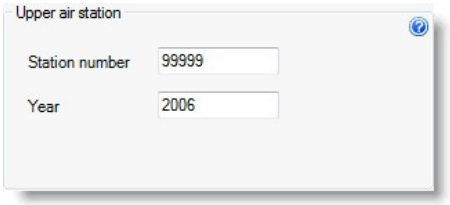
YYYY/MM/DD/HH

where:

YYYY = four digit year
MM = two digit month
DD = two digit day
HH = hour



Upper air station



Model Keyword: UAIRDATA

Station number: Select this field to enter the upper station ID number (e.g., the WBAN number for NWS stations). This information will be read directly from the meteorological data file if it is available. The ISC model compares the station number input with the numbers included in the header record of the surface meteorological data file, and issues non-fatal warning messages if there are any mismatches.

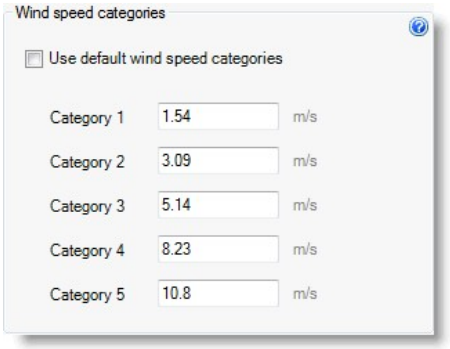
Year: Select this field to enter the year that meteorological data were collected. If the correct file format is selected, this information will be read directly from the meteorological data file.

Other Options

Wind speed categories

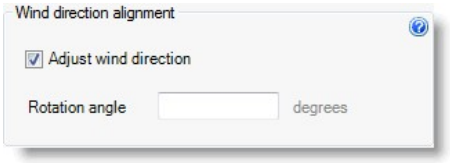
Source emission rates can vary by wind speed. The model uses six wind speed categories that are defined by the upper bound wind speed for the first five categories (the sixth category is assumed to have no upper bound). The default values for the wind speed categories are as follows: 1.54, 3.09, 5.14, 8.23, and 10.8 m/s.

The upper bounds of each wind speed category can be changed by typing in the desired value in meters/sec. To use the default wind speed categories, click on the Use default wind speed categories check box.



Wind direction alignment

If the meteorological data must be corrected for wind direction alignment problems, enter the number of degrees by which all input wind directions or flow vectors should be rotated into the Rotation Angle text box. The ISC model uses the flow vector (the direction toward which the wind is blowing) as a model input parameter while the AERMOD model uses the wind direction (from which the wind is blowing). Thus, if the meteorological input data provides wind direction (the direction from which the wind is blowing), you can convert to flow vectors by entering 180 as the wind rotation angle.



Output Options

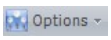
Output options are used to specify the type of output you want generated by the model. To launch the Output Options form, choose the Control Options button from the Project tab

or select *Control Options* from the Options menu under the Model group in the other tabs.

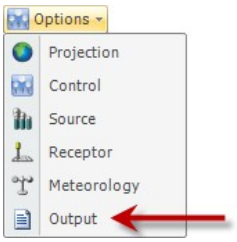
There are a number of data files that can be created.

To access this form...

From the Project Tab: *Click on:*

From Other Tabs: *Click on* 

from the Model group.



Folders on the Output Options Form

Options: The Options tab allows the user to select the type of output data desired.

Tables: The Table tab provides options to generate data tables within the main model output file.

Plot Files: Plot files are external to the main model output file and can be used to generate contour plots within 3DAnalyst.

Post Files: Post files are external to the main model output file and can be used to generate time series plots 3DAnalyst.

Max Files: The Max file allows the user the option to generate a file or files of threshold violations for specific source group and averaging period combinations.

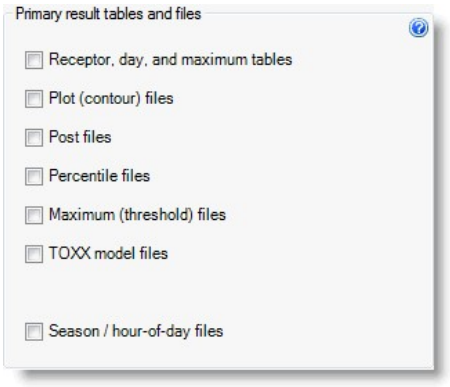
Toxx Files: This file type produces unformatted (binary) files of raw results above a threshold value with a special structure for use with the TOXX model component of TOXST.

Season/Hour Files: The Season / Hour file option is used to output a file containing the average results by season and hour-of-day.

Options

Primary result tables and files

Select the type of results you desire. A folder will be displayed for each option selected. Click on each folder to provide detailed output options.



Receptor, day, and maximum tables:

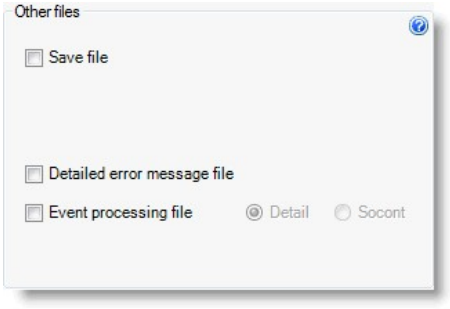
Receptor: (Model Keyword: RECTABLE) Specifies the selection of high value by receptor table output options.

Day: (Model Keyword: DAYTABLE) Specifies the selection of overall maximum value table output options.

Maximum: (Model Keyword: MAXTABLE) Specifies the selection of printed results (by receptor) for each day of data processed (this option can produce very large files and such be used with care).

Other files

AERMOD can generate a number of "other" output files. These file types are described below.



Save file: (Model Keyword: SAVEFILE) Check this option to save intermediate results in an unformatted file so that you can restart a model run in the event of a power failure or user interrupt. A save file will be created with the same name as the input file and a .ims file extension. To restart a model run using the save file, use the Restart option in the Control Options form.

Generate detailed error message file: (Model Keyword: ERRORFIL) Select this option to create a detailed listing file of all the messages generated by the model. This includes the error and warning messages that are listed as part of the message summaries provided in the main output file, and also any

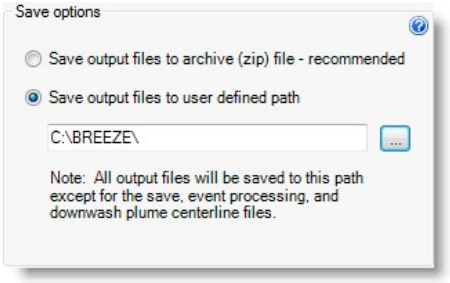
informational messages (such as occurrences of calm winds) and quality assurance messages that are generated.

Generate event processing file: (Model Keyword: EVENTFIL) Check this option if you want to create an event file to perform source contribution analyses for short-term average events. If checked, ISC will generate an input file for event processing. The name of this event input file is set as "Event input file" by default. The event run output file will contain detailed the source contribution information summaries.

Detail: Select this option to produce basic source contribution information. Provides the hourly average concentration (or total deposition) values for each source for every hour in the averaging period, and a summary of the hourly meteorological data for the event period. In general, the this option produces a larger output file than the Source contribution option, especially if there are a large number of sources.

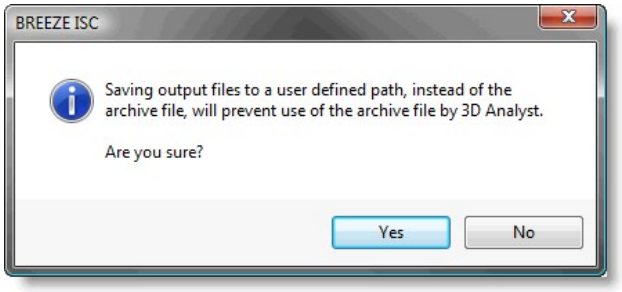
Source contribution: Select this option to produce only the source contribution information in the output file. Provides the average concentration (or total deposition) value (i.e., the contribution) from each source for the period corresponding to the event for the source group.

Save Options


Save options
Save output files to archive (zip) file - recommended
Save output files to user defined path
C:\BREEZE\
...
Note: All output files will be saved to this path except for the save, event processing, and downwash plume centerline files.

Save output files to archive (zip) file - recommended: BREEZE will create a compressed .isz file that stores all the input and output files associated with the current model scenario. This is the preferred method as it makes it easy to transport (e.g., send via email) and store model scenarios. Files stored using in the .isz format can be extracted using the BREEZE Zip File Manager utility available from the Tools menu item and post processed with BREEZE 3D Analyst.

Save output files to user defined path: This option allows the user to define a directory and pathway to save model output files to. If this option is selected, output results will not be stored in the .isz file which is used to view model results in BREEZE 3D Analyst. The following informational message is displayed when this option is selected.


BREEZE ISC
Saving output files to a user defined path, instead of the archive file, will prevent use of the archive file by 3D Analyst.
Are you sure?
Yes
No